CBSE

2027

SCIENCE

CHAPTERWISE QUESTION BANK

Based on NCERT Curiosity Textbook

Class

8

NODIA

Nodia

Scan QR for Demo PDF

GET ALL STUDY MATERIAL IN ONE APP!

- Textbooks
- Previous Year Chapterwise Question Banks
- 30 Sets Sample Papers
- Worksheets

FREE!

DOWNLOAD NOW!

SCAN & DOWNLOAD

GET IT ON Google Play

CBSE 2027

SCIENCE

Including Case Based Questions

CLASS 8

Chapter-wise Question Bank

NODIA

Downloaded from www.pdf.tube

CBSE Class 8th Science Question Bank
Edition April 2026
Published by : NODIA
An Imprint of NODIA EDITIONS LLP

Information contained in this book has been obtained by author, from sources believes to be reliable. However, neither NODIA nor its author guarantee the accuracy or completeness of any information herein and NODIA nor its author shall be responsible for any error, omissions, or damages arising out of use of this information. This book is published with the understanding that NODIA and its author are supplying information but are not attempting to render engineering or other professional services.

© NODIA EDITIONS LLP

MRP ₹450.00

NODIA

available at amazon

This book is available on amazon and flipkart only and not available in market.

NODIA EDITIONS LLP
125, Sector 6, Vidyadhar Nagar, Jaipur 302039
Phone :+91 9024037387
email : mail@nodia.in

CONTENTS

CHAP 1.	Exploring the Investigative World of Science	5-34
CHAP 2.	The Invisible Living World : Beyond Our Naked Eye	35-69
CHAP 3.	Health : The Ultimate Treasure	70-103
CHAP 4.	Electricity : Magnetic and Heating Effects	104-137
CHAP 5.	Exploring Forces	138-170
CHAP 6.	Pressure, Winds, Storms and Cyclones	171-205
CHAP 7.	Particulate Nature of Matter	206-238
CHAP 8.	Nature of Matter : Elements, Compounds and Mixtures	239-270
CHAP 9.	The Amazing World of Solutes, Solvents and Solutions	271-303
CHAP 10.	Light : Mirrors and Lenses	304-335
CHAP 11.	Keeping Time with the Skies	336-368
CHAP 12.	How Nature Works in Harmony	369-402
CHAP 13.	Our Home : Earth, a Unique Life Sustaining Planet	403-435

****

Click Here to Buy book on Amazon

Scan QR Code for Demo PDF of Book

NODIA APP

From Class 1st to Class 12th

Free PDF For All Study Material

Search Play Store by NODIA

CHAPTER 1

EXPLORING THE INVESTIGATIVE WORLD OF SCIENCE

SUMMARY

1. THE SPIRIT OF SCIENTIFIC INVESTIGATION

1.1 From Wonder to Investigation

Science in Grade 8 moves beyond just asking "Why?". The focus is on active investigation. It's not just about learning facts, but about learning how to find new facts for yourself.

1.2 The Core Process of Investigation

Scientific investigation involves a clear, step-by-step process:

1. Asking focused questions about the world around you.
2. Designing simple experiments to find answers.
3. Observing carefully what happens during your experiment.
4. Explaining your finding sclearly.

1.3 The Scientific Mindset

To be a good investigator, you need to balance two key ideas:

1. Grounded Knowledge (The Root):Base your work on careful, real-world observations.
2. Creative Thinking (The Kite):Allow your curiosity and ideas to explore new possibilities.

2. A PREVIEW OF GRADE 8 SCIENCE TOPICS

2.1 The World of Microbes

1. We will explore the hidden world of tiny organisms, or microbes, found even in a single drop of water.
2. We'll learn about helpful microbes that assist in digestion or making medicines, and harmful microbes that cause infections.

2.2 Health and the Human Body

1. This section will cover how our bodies stay healthy and fight infections.
2. Key elements include nutritious food, regular exercise, medicines, and vaccines.

2.3 Electricity and Its Effects

We will study how electric current is used in daily life. This includes the heating effect(used in heaters) and the magnetic effect(which helps motors run).

2.4 Forces and Pressure

Forces are what cause objects to speed up, slow down, or change their direction of motion.
Pressure is defined as the amount of force applied over a specific area. These concepts explain things like a falling ball or a car using its brakes.

2.5 Weather Phenomena

The principles of force and pressure also explain how air moves.
A small difference in air pressure causes a gentle breeze, while a large difference can lead to powerful storms and cyclones.

2.6 The Particle Nature of Matter

Everything around us is made of tiny particles.
The behavior of these particles determines the state of matter. In solids, particles can't move much, but in gases, they move around freely.
Matter can be classified into elements, compounds, and mixtures.

2.7 The World of Light

We'll study how light behaves, including:
Reflection : Light bouncing off surfaces like mirrors.
Refraction : Light bending as it passes through lenses, which is how eyeglasses work.

Downloaded from www.pdf.tube

The Moon shines because it reflects sunlight. The phases of the Moon .we see are caused by the changing positions of the Earth, Moon, and Sun.

2.8 Ecosystems and Life on Earth

An ecosystem is the complex web of relationships between living organisms (plants, animals) and their non-living environment (air, water, sunlight).

2.9 Our Planet's Future

Earth is uniquely suited for life because of its ideal distance from the Sun, presence of liquid water, and a protective atmosphere.
Human activities are causing changes in the Earth's climate, which presents a serious challenge. Science provides the tools to understand these changes and find solutions to protect our planet.

3. HOW TO INVESTIGATE LIKE A SCIENTIST : THE PURI EXAMPLE

This section shows how to apply the scientific method to an everyday observation : Why does a puri puff up and have one thin side?

3.1 The "Laboratory" is Everywhere

You don't need a formal lab to do science. Your kitchen is a great place to start observing and experimenting.

3.2 Steps for a Systematic Investigation

1. Ask a Clear Question. Start with what you want to find out. For instance, what factors affect how a puri puffs up?
2. Identify Variables.
   (i) Things You Can Change (Control Variables):The thickness of the dough, the type of flour, or the temperature of the oil.
   (ii) Things You Can Observe (Dependent Variables):Whether the puri puffs up, how long it takes, or the thickness of the final product.
3. Control the Experiment. To get clear results, change only one thing at a time. For example, to test oil temperature, use dough pieces of the exact same thickness and size for each test.
4. Record Everything. Keep notes of all your observations what you see, smell and hear.
5. Ask New Questions. Your results will likely lead to more questions for future experiments, like "Does dough that has been stored work differently?"

3.3 The Nature of Science

This method of systematic investigation is the foundation of all scientific experiments, from simple to complex. Even an everyday observation can be scientifically fascinating and may not be completely understood yet.

MULTIPLE CHOICE QUESTION

NODIA

1. What is the primary goal for students in Grade 8 science?
(A) To learn how to find new facts through investigation.
(B) To memorize a list of scientific facts.
(C) To focus only on the mysteries of Earth.
(D) To build complex laboratory equipment.

Ans :

(A) To learn how to find new facts through investigation.
The focus for Grade 8 is to move beyond simply learning facts to understanding the process of scientific investigation. This involves asking focused questions, designing experiments and using observations to build understanding, empowering students to become investigators themselves.

2. The root symbol is to 'grounded observations' as the kite symbol is to _____.
(A) Historical data
(B) Complex calculations
(C) Peer-reviewed articles
(D) Creative thinking

Ans :

(D) Creative thinking
The textbook uses the root to symbolize being grounded in careful, real-world observations. The kite represents allowing ideas and curiosity to soar towards new horizons. This combination illustrates the balance between observation and creative thinking in scientific investigation.

3. What does the chapter identify as the starting point for scientific exploration in Grade 6?
(A) Complex experiments using lab equipment.
(B) Mathematical formulas from textbooks.
(C) Wonder and simple questions like "Why?" and "How?"
(D) Reading historical science journals from the library.

Ans :

(C) Wonder and simple questions like "Why?" and "How?"
The journey into science begins with a sense of wonder about the world. Simple, fundamental questions such as "Why?" and "How?" are the initial sparks that ignite curiosity and lead to scientific exploration and discovery.

4. What is meant by 'investigation' in the context of Grade 8 science?
(A) Observing something and asking simple, unfocused questions.
(B) Asking focused questions and then designing simple experiments to find the answers.
(C) Reading about major scientific discoveries in various books.
(D) Watching science documentaries without any planned follow-up activities.

Ans :

(B) Asking focused questions and then designing simple experiments to find the answers.
Scientific investigation is defined as a focused process that goes beyond simple questioning. It involves designing methodical ways, such as simple experiments, to seek answers, and then using the resulting observations to refine one's understanding of a phenomenon.

5. According to the chapter's overview, what causes a gentle breeze or even a cyclone?
(A) Differences in air pressure.
(B) The magnetic effect of electric current.
(C) The bending of light through lenses.
(D) The gravitational pull of the Moon.

Ans :

(A) Differences in air pressure.
The movement of air is driven by pressure differences in the atmosphere. A small difference can create a gentle breeze, while a much larger pressure difference can generate powerful air movements like strong winds and cyclones.

6. What is the correct sequence for a scientific investigation as described in the chapter for the 'puri' example?
(A) Observe → Ask a Question → Experiment
(B) Experiment → Observe → Ask a Question
(C) Ask a Question → Observe → Form a Conclusion
(D) Ask a Question → Experiment → Observe

Ans :

(D) Ask a Question → Experiment → Observe
The scientific investigation process starts with a scientific question. This is followed by designing and conducting an experiment to test the question. Finally, careful observation during the experiment provides the data needed to understand the phenomenon.

7. If you want to test how the thickness of dough affects a puri puffing up, what is the most important condition to maintain?
(A) Change the dough thickness only, keeping factors like oil temperature constant.
(B) Change the dough thickness and the type of flour used in each test.
(C) Use a different temperature of oil for each different dough thickness.
(D) Fry each puri for a completely different and random amount of time.

Ans :

(A) Change the dough thickness only, keeping factors like oil temperature constant.
To conduct a fair and systematic investigation, it is crucial to change only one variable at a time. To test the effect of dough thickness, all other conditions, such as oil temperature and flour type, must remain the same.

8. Which of the following is a correct statement about the particles in solids and gases as mentioned in the chapter overview?
(A) Particles in solids move around freely, while gas particles are quite restricted.
(B) Particles in solids cannot move much, while gas particles move around freely.
(C) Particles in both solids and gases are completely fixed in their positions.
(D) Particles in both solids and gases are able to move around completely freely.

Ans :

(B) Particles in solids cannot move much, while gas particles move around freely.
The state of matter is determined by the movement of its constituent particles. In solids, particles are tightly packed and have limited movement. In gases, particles are far apart and move freely and randomly, filling the available space.

9. A _____ difference in pressure can result in a gentle breeze, while a stronger pressure difference can lead to _____.
(A) Large, calm weather (B) Small, light rain
(C) Small, cyclones (D) Large, humidity

Click Here to Buy book on Amazon

CBSE CLASS 12

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English Core	Mathematics	Physics	Chemistry
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Biology	Physical Education	Informatics Practice	Computer Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Accountancy	Business Studies	Economics	Entrepreneurship
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Legal Studies	Applied Maths	Hindi	History
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Geography	Political Science	Psychology	Sociology
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF(NEET, JEE and CUET) visit www.pdf.tube

CBSE CLASS 11

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English Core	Mathematics	Physics	Chemistry
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Biology	Physical Education	Informatic Practice	Computer Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Accountancy	Business Studies	Economics	Entrepreneurship
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Legal Studies	Applied Maths	Hindi	History
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Geography	Political Science	Psychology	Sociology
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF (NEET, JEE and CUET) visit www.pdf.tube

CBSE CLASS 10

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English LL	English Comm	Mathematics STD	Mathematics Basic
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Science	Social Science	IT (402)	AI (417)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Data Science (419)	हिंदी अ	हिंदी ब	संस्कृत
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

विज्ञान	सामाजिक विज्ञान	गणित मानक	गणित आधार
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For Olympiad Books Visit

www.lympiad.com

For other books PDF visit www.pdf.tube

CBSE CLASS 9

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English LL	English Comm	Mathematics STD	Mathematics Basic
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

Science	Social Science	IT (402)	AI (417)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

Data Science (419)	हिंदी अ	हिंदी ब	संस्कृत
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

विज्ञान	सामाजिक विज्ञान	गणित मानक	गणित आधार
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

For Olympiad Books Visit

www.lympiad.com

For other books PDF visit www.pdf.tube

CBSE CLASS 8

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English	Mathematics	Science	Social Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

हिंदी	संस्कृत	IT (906)	AI (901)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Data Science (911)	Coding (910)	विज्ञान	सामाजिक विज्ञान
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित	NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Science	Olympiad Maths	Olympiad General Aptitude	
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	For Olympiad Books Visit www.lympiad.com
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	

For other books PDF visit www.pdf.tube

CBSE CLASS 7

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English	Mathematics	Science	Social Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

हिंदी	संस्कृत	IT (906)	AI (901)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Data Science (911)	Coding (910)	विज्ञान	सामाजिक विज्ञान
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित	NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Science	Olympiad Maths	Olympiad General Aptitude	
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	For Olympiad Books Visit www.lympiad.com
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	

For other books PDF visit www.pdf.tube

CBSE CLASS 6

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English	Mathematics	Science	Social Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

हिंदी	संस्कृत	IT (906)	AI (901)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Data Science (911)	Coding (910)	विज्ञान	सामाजिक विज्ञान
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित	NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Science	Olympiad Maths	Olympiad General Aptitude	
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	For Olympiad Books Visit www.lympiad.com
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	

For other books PDF visit www.pdf.tube

CBSE CLASS 5 and 4
Worksheets

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English 5th	Mathematics 5th	EVS 5th	हिंदी 5th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 5th	EVS हिन्दी 5th	Olympiad Maths 5th	Olympiad Science 5th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Aptitude 5th	Olympiad Aptitude 4th
BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For Olympiad Books Visit
www.lympiad.com

English 4th	Mathematics 4th	EVS 4th	हिंदी 4th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 4th	EVS हिन्दी 4th	Olympiad Maths 4th	Olympiad Science 4th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF visit www.pdf.tube

CBSE CLASS 3 and 2
Worksheets

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English 3th	Mathematics 3th	EVS 3th	हिंदी 3th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 3th	EVS हिन्दी 3th	Olympiad Maths 3th	Olympiad Science 3th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Aptitude 3th	Olympiad Aptitude 2th
BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For Olympiad Books Visit
www.lympiad.com

English 2th	Mathematics 2th	EVS 2th	हिंदी 2th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 2th	EVS हिन्दी 2th	Olympiad Maths 2th	Olympiad Science 2th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF visit www.pdf.tube

CBSE CLASS 1 and KG
Worksheets

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English 1th	Mathematics 1th	EVS 1th	हिंदी 1th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 1th	EVS हिन्दी 1th	Olympiad Maths 1th	Olympiad Science 1th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Aptitude 1th	Olympiad Aptitude KG
BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For Olympiad Books Visit
www.lympiad.com

English KG	Mathematics KG	EVS KG	हिंदी KG
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित KG	EVS हिन्दी KG	Olympiad Maths KG	Olympiad Science KG
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF visit www.pdf.tube

Ans :

(C) Small, cyclones
The magnitude of the pressure difference in the atmosphere dictates the strength of the resulting air movement. A small pressure differential is sufficient to cause a gentle breeze, whereas a significant and strong pressure difference is the driving force behind powerful weather events like cyclones.

10. Which of the following is NOT mentioned as a topic of investigation for the Grade 8 curriculum?
(A) The world of tiny organisms and microbes.
(B) The forces that make objects move or stop.
(C) The phases of the Moon and their link to calendars.
(D) The detailed chemical composition of very distant stars.

Ans :

(D) The detailed chemical composition of very distant stars.
The chapter provides an overview of the topics to be covered, including microbes, forces, pressure, weather, light, matter, and the Moon. However, the specific chemical composition of distant stars is a more advanced topic not mentioned in this introduction.

11. The chapter mentions that a kitchen can be a wonderful place for scientific observation. Which phenomenon is used as a primary example to illustrate this?
(A) How a puri puffs up when fried in hot oil.
(B) How water boils at a certain temperature.
(C) How sugar dissolves in tea.
(D) How ice melts into water.

Ans :

(A) How a puri puffs up when fried in hot oil.
The chapter uses the everyday kitchen phenomenon of a puri puffing up to demonstrate the entire process of scientific investigation. It shows how to form questions, identify variables, and conduct simple experiments without needing a formal laboratory.

12. How does the chapter classify materials like elements, compounds, and mixtures?
(A) Based on their magnetic properties.
(B) Based on whether they are pure substances or combinations.
(C) Based on their color and texture.
(D) Based on their ability to conduct electricity.

Ans :

(B) Based on whether they are pure substances or combinations.
The chapter introduces the classification of materials based on their composition. Elements are pure substances, compounds are two or more elements bonded together, and mixtures are physical combinations of substances that can be separated.

13. What fundamental idea about scientific knowledge was emphasized in Grade 7, as a stepping stone to Grade 8's investigative approach?
(A) Science is simply a collection of facts that are unchanging.
(B) True scientific knowledge is only found within approved textbooks.
(C) Science is always evolving, and each answer opens new questions.
(D) All the major scientific questions have already been answered.

Ans :

(C) Science is always evolving, and each answer opens new questions.
The Grade 7 curriculum highlighted that science is a dynamic and evolving field. It established the concept that scientific understanding changes and deepens as new questions arise from previous answers, setting the stage for the investigative process in Grade 8.

14. What is the heating effect of electric current used for, as per the chapter's preview?
(A) To run motors and machines.
(B) To create calendars.
(C) To study the phases of the Moon.
(D) To keep us warm.

Ans :

(D) To keep us warm.
The text explicitly states that the heating effect of electric current is a principle we depend on for various applications, including devices that help keep us warm, such as electric heaters. This contrasts with the magnetic effect, used for motors.

15. Which of the following statements about microbes, based on the chapter's introduction, is incorrect?
(A) Every single microbe is harmful and causes infections.
(B) Some microbes are helpers that aid digestion.
(C) Microbes are easily found in a single drop of water.
(D) Some microbes are used in the production of medicines.

Downloaded from www.pdf.tube

Ans :

(A) Every single microbe is harmful and causes infections.
The chapter clearly distinguishes between different types of microbes. It states that while some can be harmful and cause infections, others are "invisible helpers" that are beneficial, for example, by aiding digestion or being used in medicine production.

16. An element is to a pure substance as a _____ is to a combination that can be separated physically.
(A) Compound (B) Mixture
(C) Solution (D) Particle

Ans :

(B) Mixture
An element is a fundamental type of pure substance. Similarly, a mixture is defined as a combination of substances that are not chemically bonded and, therefore, can be separated by physical means, fitting the description in the analogy.

17. A student wants to investigate if different types of flour (atta, maida) affect how a puri puffs up. Which of the following would be a controllable variable in this experiment?
(A) Whether the puri puffs up or not.
(B) The time it takes for the puri to puff up.
(C) The type of flour used.
(D) The final color of the fried puri.

Ans :

(C) The type of flour used.
In an experiment, controllable variables are the factors that the investigator intentionally changes or manipulates to observe an effect. In this case, the student is testing different flour types, making the type of flour the controllable variable.

18. Asking "what happens if...?" → Designing an experiment → _____ → Improving understanding. Which step is missing in this scientific process?
(A) Publishing the results
(B) Getting an expert's opinion
(C) Buying laboratory equipment
(D) Making careful observations

Ans :

(D) Making careful observations
The process of scientific investigation involves asking a question, designing an experiment to answer it, and then carefully observing the outcomes of that experiment. These observations provide the data and insights needed to draw conclusions and improve understanding.

19. What is the term for a pure substance formed when two or more elements are bonded together?
(A) Compound (B) Mixture
(C) Solution (D) Particle

Ans :

(A) Compound
A compound is a distinct substance that is formed when two or more different elements are chemically bonded together in a fixed ratio. Unlike mixtures, the elements in a compound cannot be separated by physical means.

20. The chapter explains that the beautiful phases of the Moon are a direct result of what?
(A) The Earth's rotation on its axis.
(B) The relative positions of the Earth, Moon, and Sun.
(C) The reflection of light off rough surfaces on Earth.
(D) The bending of light through Earth's atmosphere.

Ans :

(B) The relative positions of the Earth, Moon, and Sun.
The phases of the Moon we observe are caused by the changing angles at which we view the Moon's sunlit surface as it orbits the Earth. The amount of the illuminated hemisphere we see depends entirely on the Moon's position relative to the Earth and the Sun.

21. A student conducts an experiment on puris and carefully notes down that the oil splattered and smoked at a high temperature. What scientific practice is the student following?
(A) Changing multiple variables at once.
(B) Ignoring unexpected results.
(C) Keeping detailed notes of all observations.
(D) Forming a conclusion before the experiment.

Ans :

(C) Keeping detailed notes of all observations.
A key part of a good scientific experiment is meticulous record-keeping. Noting all sensory details, such as splattering oil or smoke, provides a complete picture of the experimental conditions and outcomes, which is crucial for analysis.

NODIA
Download INDIA's Best Study app NODIA

22. What human invention was developed by observing the periodic cycles of the Moon's phases?
(A) The telescope
(B) The microscope
(C) The electric motor
(D) The first calendars

Ans :

(D) The first calendars
The early humans used careful observations of the predictable, repeating cycles of the Moon's phases, along with solar cycles, as a basis for creating the first calendars to track time and seasons.

Download INDIA's Best Study app NODIA

23. Why is it important to change only one thing at a time during a scientific experiment?
(A) To ensure results can be clearly linked to the variable that was changed.
(B) To make the experiment finish in a much shorter time.
(C) To make the experimental process less boring and more engaging.
(D) To use as many different types of materials as possible in one test.

Ans :

(A) To ensure results can be clearly linked to the variable that was changed.
Controlling variables is a fundamental principle of experimental design. By changing only one factor and keeping all others constant, an investigator can confidently attribute any observed changes in the outcome to that specific variable, establishing a clear cause-and-effect relationship.

24. The magnetic effect of electric current helps _____ run, while the heating effect helps to keep us _____.
(A) Calendars, healthy
(B) Motors, warm
(C) Microbes, safe
(D) Telescopes, illuminated

Ans :

(B) Motors, warm
The chapter overview distinguishes between two key effects of electric current. The magnetic effect is the principle behind the operation of motors and machines, while the heating effect is utilized in appliances designed to generate warmth.

Download INDIA's Best Study app NODIA

25. What visual metaphor is used on the textbook pages to represent the foundation of knowledge and connection to our heritage?
(A) A soaring kite
(B) A glowing light bulb
(C) The image of a root
(D) A magnified water drop

Ans :

(C) The image of a root
The design of the page numbers, explaining that the image of a root on the left-hand pages symbolizes the deep, solid foundation of knowledge that connects us to our environment, traditions, and heritage.

26. Which of the following is a correct statement regarding the scientific understanding of a puri swelling?
(A) It is a simple process that has been fully understood for centuries.
(B) It is primarily caused by the magnetic effect of the hot cooking oil.
(C) It will only happen if the dough is pricked with a hole before frying.
(D) It is a complex phenomenon not yet completely understood by scientists.

Ans :

(D) It is a complex phenomenon not yet completely understood by scientists.
The chapter uses the puri example to illustrate that even simple, everyday observations can involve complex scientific principles. It explicitly states that the phenomenon of a puri swelling is not yet completely understood by scientists today.

27. The chapter mentions several examples of scientific puzzles, ranging from everyday life to bigger mysteries. Which of the following is NOT given as an example?
(A) What is the exact, measured speed of light in a vacuum?
(B) Why does bread dough rise when it is left in a warm place?
(C) Is it true that the world is getting warmer over time?
(D) Why does a ball thrown up always fall back to the ground?

Ans :

(A) What is the exact, measured speed of light in a vacuum?

Click Here to Buy book on Amazon

The chapter lists several questions to spark curiosity, such as why dough rises, the issue of global warming, and the effect of gravity on a ball. The speed of light, while a valid scientific topic, is not mentioned in this introductory list.

28. If a student asks, "What happens if I prick a hole in the puri before frying?", what stage of the scientific method does this represent?
(A) Forming a final conclusion.
(B) Asking a new question based on an initial investigation.
(C) Publishing a scientific paper.
(D) Disregarding the experimental data.

Ans :

(B) Asking a new question based on an initial investigation.
This question demonstrates the iterative nature of science. After conducting an initial round of experiments, new questions often arise. This shows the student is thinking like a scientist, using their observations to generate further lines of inquiry.

29. The chapter overview suggests that understanding forces and pressure is key to explaining why _____.
(A) Sugar dissolves in tea
(B) Light bends through a lens
(C) A car stops when brakes are applied
(D) Microbes cause infections

Ans :

(C) A car stops when brakes are applied
The text directly links the study of forces to real-world applications like explaining the motion of objects. It specifically mentions that understanding forces helps explain why a car stops when the brakes are applied, which involves the force of friction.

30. What is an ecosystem, as described in the chapter's preview?
(A) A simple collection of calendars from different ancient cultures.
(B) A system for classifying all materials into elements and compounds.
(C) The various tools used by astronomers to observe distant planets.
(D) The relationships between living organisms and their environments.

Ans :

(D) The relationships between living organisms and their environments.
The chapter defines ecosystems as the complex and marvelous patterns of relationships that exist on Earth. This includes how every living being depends on and responds to the air, water, sunlight, and other organisms around it.

Download INDIA's Best Study app NODIA

31. Which of the following statements about the Grade 8 science journey is incorrect based on the introduction?
(A) It requires a fancy laboratory for all experiments.
(B) It will explore topics from tiny microbes to planet-wide challenges.
(C) It emphasizes balancing careful observation with creative thinking.
(D) It encourages students to become investigators and young scientists.

Ans :

(A) It requires a fancy laboratory for all experiments.
The text explicitly states the opposite. It emphasizes that science is everywhere and that you don't need a fancy laboratory. It uses the kitchen as an example of a wonderful place to observe, ask questions, and do simple experiments.

NODIA

32. What is the first step in investigating the puffing of a puri like a scientist?
(A) Immediately start frying puris of different sizes.
(B) Ask a scientific question about what might change the way it puffs up.
(C) Write down a conclusion.
(D) Measure the temperature of the oil.

Ans :

(B) Ask a scientific question about what might change the way it puffs up.
The scientific investigation process begins with curiosity formulated into a testable question. Before any experimentation or measurement, a scientist must first define the problem or phenomenon they wish to understand by asking a specific, scientific question.

33. What is the main message conveyed by the balance between the 'root' and the 'kite' symbols in the textbook?

(A) Science requires only a good imagination with no factual basis.
(B) Science requires only data collection and no creative new ideas.
(C) Science works best by combining careful observation with creative thinking.
(D) The root symbol is for biology, and the kite symbol is for physics.

Ans :

(C) Science works best by combining careful observation with creative thinking.
The two symbols together represent the core of the scientific method. The 'root' signifies staying grounded in facts and careful observation, while the 'kite' signifies letting curiosity and creative ideas soar. The balance between them is essential for effective investigation.

34. What protects the Earth from the Sun's harmful ultraviolet rays, according to the chapter overview?
(A) Its distance from the Sun alone.
(B) Its liquid water.
(C) Its magnetic field.
(D) Its atmosphere.

Ans :

(D) Its atmosphere.
The chapter's final section mentions that Earth is 'just right' for life due to several factors. It specifically states that the atmosphere not only provides oxygen but also shields the planet from harmful ultraviolet radiation from the Sun.

35. A student measures the time it takes for a puri to puff up. What kind of data is the student collecting?
(A) Numerical data.
(B) Yes/No data.
(C) Color-based data.
(D) Texture-based data.

Ans :

(A) Numerical data.
The text distinguishes between different types of observations. Measuring the time in seconds is an example of collecting a number that can be measured, which is classified as numerical data, as opposed to a simple yes/no observation.

36. A group of students is investigating why some puris are thinner on one side. They decide to try sliding the dough into the oil at different angles. In this experiment, what have they identified?
(A) A possible conclusion.
(B) A variable that they can control.
(C) A type of observation to measure.
(D) An unavoidable error in the experiment.

Ans :

(B) A variable that they can control.
The chapter explains that part of designing an experiment is identifying what can be changed or controlled. The way the dough is dropped into the oil is listed as an example of a factor that the investigators can intentionally control to see if it makes a difference.

37. The chapter mentions studying how light reflects off mirrors and bends through lenses. This understanding helps explain the working of what common objects?
(A) Electric motors
(B) Cyclones
(C) Corrective glasses
(D) Vaccines

Ans :

(C) Corrective glasses
The overview of the light chapter directly connects the principle of light bending (refraction) to practical applications. It explicitly mentions that this principle explains how corrective glasses work to help people see clearly.

38. Grade 6 science is to "wonder" as Grade 8 science is to _____.
(A) "History"
(B) "Answers"
(C) "Memorization"
(D) "Investigation"

Ans :

(D) "Investigation"
The text presents a progression of scientific learning through the grades. Grade 6 starts with "wonder," Grade 7 explores how science "evolves," and Grade 8 takes the next step into the "Investigative World of Science," bringing the previous concepts together.

39. What is the direct cause of an image appearing in a shiny metal spoon, as mentioned in the chapter?
(A) The bending of light as it reflects off the curved surface.
(B) The heating effect of the surrounding air.
(C) The magnetic properties of the metal.
(D) The pressure exerted by the person holding the spoon.

Downloaded from www.pdf.tube

Ans :

(A) The bending of light as it reflects off the curved surface.
The chapter uses the example of a shiny spoon to illustrate the principles of light. It explains that the image we see is a result of light rays bending as they reflect from the curved metallic surface of the spoon.

Download INDIA's Best Study app NODIA

40. What are 'observable' or 'measurable' aspects in an experiment, according to the puri investigation example?
(A) The thoughts and private opinions of the person experimenting.
(B) The outcomes that can be noted, like 'yes/no' or numerical values.
(C) The various factors that can be intentionally changed or controlled.
(D) The historical context of the scientific phenomenon being studied.

Ans :

(B) The outcomes that can be noted, like 'yes/no' or numerical values.
To make sense of an experiment, one needs to define what can be observed or measured as an outcome. The chapter gives examples like checking if the puri puffs up (a yes/no answer) or measuring the time it takes (a numerical value).

41. Which statement accurately reflects the book's perspective on science?
(A) Science is only conducted in high-tech laboratories.
(B) Science is a static collection of facts that never changes.
(C) Science is everywhere, including in everyday activities in the kitchen.
(D) Only professional scientists can ask scientific questions.

Ans :

(C) Science is everywhere, including in everyday activities in the kitchen.
A central theme of the chapter is that science is not confined to a laboratory. It explicitly encourages students to see their own kitchens as places for observation and experimentation, emphasizing that curiosity and careful observation are the main requirements.

Download INDIA's Best Study app NODIA

42. The chapter's journey starts by examining a single drop of water to uncover a hidden world of _____ and ends by understanding what makes Earth 'just right' for _____.
(A) Chemicals, industry
(B) Light rays, observation
(C) Forces, motion
(D) Organisms, life

Ans :

(D) Organisms, life
The text outlines the scope of the book's content. It begins with the microscopic world of tiny organisms in a drop of water and concludes with the macroscopic, planetary-scale question of the conditions that make Earth habitable for life.

43. At the heart of the problem and the solution to climate change, the chapter identifies _____.
(A) Human activities.
(B) The Sun's activity
(C) The motion of distant planets
(D) The Earth's natural cycles alone

Ans :

(A) Human activities.
The chapter concludes its overview by highlighting the role of humans in climate change. It states that "At the heart of both the problem—and any possible solution is us," emphasizing that human activities influence the climate and that science can guide our actions.

44. What two fundamental forces are mentioned in the overview that help explain the motion of objects?
(A) Electric and Magnetic forces
(B) Push and Pull forces
(C) Nuclear and Weak forces
(D) Gravitational and Frictional forces

Ans :

(B) Push and Pull forces
While gravity and friction are types of forces, the chapter introduces the topic by first discussing the fundamental forces that make objects speed up, slow down, or change direction, which are the basic concepts of push and pull.

45. Based on the chapter, which statement about scientific investigation is incorrect?
(A) It is a good idea to keep detailed notes of everything you see and sense.
(B) After one round of experiments, you may think of more scientific questions.

NODIA

(C) It is better to change many things at once to get much faster results.
(D) Systematic investigation is the main idea behind all scientific experiments.

Ans :

(C) It is better to change many things at once to get much faster results.
The chapter explicitly advises against this. It states, "...it is better to change only one thing at a time while keeping the other conditions same." This principle of controlling variables is crucial for a valid and systematic investigation.

46. The chapter describes a progression of learning. What is the correct order of concepts from Grade 6 to Grade 8?
(A) Investigation → Wonder → Evolution
(B) Evolution → Investigation → Wonder
(C) Wonder → Investigation → Evolution
(D) Wonder → Evolution → Investigation

Ans :

(D) Wonder → Evolution → Investigation
The text outlines a clear learning path. In Grade 6, science begins with wonder. In Grade 7, students learn that science is always evolving. Finally, in Grade 8, these concepts come together in the form of scientific investigation.

47. In the context of the puri experiment, 'things that we can control' are also known as _____.
(A) Variables (B) Observations
(C) Conclusions (D) Questions

Ans :

(A) Variables
The factors that can be changed or controlled in an experiment, such as dough thickness, oil temperature, or flour type, are known as variables. The goal of the experiment is to see how changing these variables affects the outcome.

48. What is the effect of the Earth's atmosphere on water, which makes our planet suitable for life?
(A) It causes water to freeze at all temperatures.
(B) It allows water to remain in its liquid state.
(C) It turns all water into vapour.
(D) It prevents water from forming.

Ans :

(B) It allows water to remain in its liquid state.
The chapter explains that Earth is at a perfect distance from the sun and has an atmosphere. This combination is crucial because it helps maintain temperatures where water can exist as a liquid, a fundamental requirement for life as we know it.

49. A student observes that a phulka swells when put on a flame and asks, "Why does it puff up like a balloon?" What is the student demonstrating?
(A) The final stage of a long and complex experiment.
(B) The ability to accurately control all experimental variables.
(C) A scientific question born from curiosity and direct observation.
(D) A complete disregard for the standard scientific method.

Ans :

(C) A scientific question born from curiosity and direct observation.
This is a perfect example of the starting point of scientific inquiry. The student has made an observation of an everyday phenomenon and, driven by curiosity, has formulated a "Why?" question, which is the first step in a scientific investigation.

50. Besides microbes, what other things does the chapter mention are needed to fight infections and stay healthy?
(A) Calendars, atmospheric pressure, and various physical forces.
(B) An electric current and a set of polished mirrors.
(C) A collection of elements, compounds, and simple mixtures.
(D) Nutritious food, exercise, medicines, and various vaccines.

Ans :

(D) Nutritious food, exercise, medicines, and various vaccines.
In the overview of the health-related topics, the text moves from microbes to the body's needs. It explicitly states, "We'll find out how nutritious food, exercise, medicines, and vaccines help us stay healthy and fight infections."

51. What is the relationship between force and pressure as introduced in the chapter?
(A) Pressure is how a force is distributed over an object.
(B) They are the same concept.
(C) Force is caused by pressure differences.
(D) They are unrelated phenomena.

Click Here to Buy book on Amazon

Ans :

(A) Pressure is how a force is distributed over an object.
The chapter introduces pressure as an idea that follows from the study of forces. It is defined by how a particular force is distributed over the area of an object, indicating they are related but distinct concepts.

52. When studying the effect of light, what object is mentioned as reflecting light, apart from polished mirrors?
(A) The Sun (B) The Moon
(C) A vaccine (D) A microbe

Ans :

(B) The Moon
The chapter's section on light broadens the concept of reflection beyond just mirrors. It states, "It's not just a polished mirror that reflects light, rough surfaces reflect light as well, and so does the Moon."

53. A student reads about Earth being 'just right' for life due to its distance from the Sun and its atmosphere. The student then wonders if a planet with a similar atmosphere but much closer to the Sun could also support life. This line of thought is an example of what?
(A) Reaching a final, unchangeable conclusion about a planet.
(B) Rejecting the initial information provided as being entirely false.
(C) Using one answer to generate new and interesting questions.
(D) Conducting a fully controlled and repeatable experiment.

Ans :

(C) Using one answer to generate new and interesting questions.
This illustrates the evolving nature of science mentioned in the text. By taking a piece of information (why Earth supports life) and using it to form a new hypothetical question, the student is demonstrating the scientific process where answers lead to deeper inquiry.

54. To do simple experiments, you don't need a fancy _____, as even your _____ at home is a wonderful place to observe.
(A) Textbook, bedroom
(B) Computer, garden
(C) Uniform, school
(D) Laboratory, kitchen

Ans :

(D) Laboratory, kitchen
The text actively de mystifies the process of science, stating that a formal laboratory is not always necessary. It specifically highlights the kitchen as an excellent environment for observing phenomena and conducting simple, insightful experiments.

55. All of the following are examples of what you can change or control when frying a puri EXCEPT:
(A) The time it takes for the puri to puff up.
(B) The thickness and size of the rolled dough.
(C) The temperature of the hot oil.
(D) The type of flour used (e.g., atta, maida).

Ans :

(A) The time it takes for the puri to puff up.
The time it takes to puff up is an outcome—something to be observed and measured. The other options are variables, which are the factors that the experimenter can intentionally change or control to see how they affect the outcome.

56. Which statement best describes the chapter's view on the relationship between living organisms and their environment?
(A) Living organisms are completely independent of their environment.
(B) Every living being depends on and responds to its surroundings.
(C) Only large animals, like mammals, depend on their environment.
(D) The environment is a static background that does not interact with life.

Ans :

(B) Every living being depends on and responds to its surroundings.
The concept of an ecosystem is introduced to show deep interconnected ness. The text emphasizes that all living things, from the smallest to the largest, are in a constant state of interaction with both the non-living and living components of their environment.

57. A scientist carefully observes, experiments thoughtfully, and explains clearly what they see. This three-part process is central to what?
(A) Writing a science fiction novel.
(B) The principles of mathematics.
(C) The investigative world of science.
(D) The historical study of art.

Ans :

NODIA

(C) The investigative world of science.
This describes the core methodology of scientific investigation as presented in the chapter. It's a systematic approach that combines careful observation, thoughtful experimentation, and clear explanation to build a reliable understanding of the natural world.

58. A question is to a starting point as an observation is to _____.
(A) An endpoint (B) A distraction
(C) A theory (D) Evidence

Ans :

(D) Evidence
In a scientific investigation, a question serves as the starting point for inquiry. The observations made during the subsequent experiment serve as the data or evidence that is used to answer that question and build understanding.

59. The chapter outlines a journey from the very small to the very large. Which pair correctly represents this scope?
(A) From a water drop to planet-wide challenges.
(B) From small atoms to larger elements.
(C) From a single puri to a massive cyclone.
(D) From the root symbol to the kite symbol.

Ans :

(A) From a water drop to planet-wide challenges.
The text explicitly frames the investigative adventure by stating it will take students "on a journey from the tiny microbes we can't see to planet-wide challenges we can't ignore," starting with a single drop of water.

60. According to the chapter, what is the key to protecting the delicate balance on which life depends?
(A) Ignoring human activities' impact on the planet's systems.
(B) Applying scientific principles like observing, measuring, and experimenting.
(C) Relying solely on historical traditions and ancient knowledge.
(D) Halting all scientific and technological progress immediately.

Ans :

(B) Applying scientific principles like observing, measuring, and experimenting.
The text concludes by stating that the same scientific principles guiding the journey through the book observing, measuring, experimenting will be essential in understanding and addressing planetary challenges, helping us protect the balance of life.

NODIA

61. The chapter states that "science is always evolving". What does this imply?
(A) Scientific facts are always incorrect and should never be trusted.
(B) The tools of science, like microscopes, will never be improved.
(C) Our understanding of the world changes and deepens as we explore.
(D) Once a scientific question is answered, it is never revisited again.

Ans :

(C) Our understanding of the world changes and deepens as we explore.
The concept of evolving science means that knowledge is not static. As new evidence is gathered and new questions are asked, scientific ideas are refined, corrected, and expanded, leading to a more complete and accurate understanding over time.

62. What kind of effect of electric current helps motors run and machines function?
(A) The heating effect.
(B) The chemical effect.
(C) The static effect.
(D) The magnetic effect.

Ans :

(D) The magnetic effect.
The chapter's overview of electricity makes a clear distinction between its effects. It explicitly states that the magnetic effect is what "helps motors run and machines function," differentiating it from the heating effect used for warmth.

63. Which of the following is an incorrect representation of the scientific process described in the chapter?
(A) It is best to accept answers without questioning them to save time.
(B) Curiosity is the starting point for asking questions.
(C) A kitchen can serve as a place for simple experiments.
(D) Keeping notes of observations is a good scientific practice.

Ans :

(A) It is best to accept answers without questioning them to save time.

The entire chapter is built on the premise of probing, pondering, and investigating. It encourages questioning and exploration, which is the opposite of passively accepting answers. The text emphasizes that every answer can lead to new questions.

64. A student notes that a puri made from stored dough puffs up differently than one made from fresh dough. This observation could lead to what new scientific step?
(A) A final, unchangeable law about puris.
(B) A new, testable question and experiment.
(C) The end of the investigation.
(D) A decision that the observation is irrelevant.

Ans :

(B) A new, testable question and experiment.
This is a prime example of how scientific inquiry works. An interesting observation leads to a new question (e.g., "Does storing dough affect how it puffs?"). This question can then be systematically investigated through a new, controlled experiment.

65. What is the main difference between a mixture and a compound as briefly introduced in the chapter?
(A) Mixtures are always liquids, while compounds are always solids.
(B) Compounds are made of one element, while mixtures are made of many.
(C) Mixture components can be separated physically; compound components cannot.
(D) Mixtures have a fixed composition, while compounds have a variable one.

Ans :

(C) Mixture components can be separated physically; compound components cannot.
The key distinction introduced is the nature of the combination. Mixtures are described as combinations that can be physically separated, whereas compounds involve elements that are chemically bonded and cannot be separated by simple physical means.

66. The chapter describes a path of scientific inquiry. Which of the following best represents the journey?
(A) Conclusion → Question → Experiment
(B) Question → Guess → Conclusion
(C) Experiment → Conclusion → Observation
(D) Observation → Question → Experiment → New Questions

Ans :

(D) Observation → Question → Experiment → New Questions
The text illustrates a cyclical and expanding process of inquiry. It starts with an observation (like a puri puffing up), which leads to a question. An experiment is designed to answer it, and the results of that experiment often lead to more observations and new questions.

67. In Grade 8, students move from just learning new _____ to learning how to _____ new facts.
(A) Facts, find (B) Questions, ask
(C) Rules, break (D) Theories, ignore

Ans :

(A) Facts, find
The chapter explicitly states its goal : "We don't want you to just learn new facts, we want you to learn how to find new facts." This highlights the shift from passive learning to active investigation.

68. Which statement accurately describes the relationship between Earth's position and its ability to support life?
(A) Earth is too close to the Sun, making it dangerously hot.
(B) Earth is at a perfect distance where water can remain liquid.
(C) Earth's distance from the Sun is irrelevant to life.
(D) Earth is too far from the Sun, making it mostly frozen.

Ans :

(B) Earth is at a perfect distance where water can remain liquid.
The chapter points out that Earth's location is a crucial factor for its habitability. It is at an ideal distance from the Sun, which allows for temperatures that permit water to exist in its liquid form, a condition essential for life.

69. A young scientist wants to see if adding salt to the dough affects how a puri puffs up. They make one batch with salt and one without, keeping the dough thickness, oil temperature, and flour type exactly the same for both batches. What is this method called?
(A) A completely random guess about how something works.
(B) A historical review of previously conducted experiments.

Downloaded from www.pdf.tube

(C) A systematic investigation with controlled variables.
(D) An opinion survey of what people think will happen.

Ans :

(C) A systematic investigation with controlled variables.
This is a classic example of a systematic investigation. By changing only one variable (the presence of salt) and keeping all other conditions (controls) the same, the scientist can reliably determine the specific effect of the salt on the outcome.

70. What is the collective term for the scientific principles of observing, measuring, and experimenting mentioned in the chapter?
(A) The literary arts.
(B) The guide to middle stages of life.
(C) The history of technology.
(D) The foundation of scientific investigation.

Ans :

(D) The foundation of scientific investigation.
The text repeatedly emphasizes that observing, measuring, and experimenting are the key, fundamental principles that guide the entire journey of scientific exploration and form the core of the investigative method.

MATCHING TYPE QUESTIONS

71. Match the following concepts related to the nature of science.

	Column A		Column B
1	Scientific Investigation	A	Using your senses to gather information, like noticing a puri puffs up.
2	Observation	B	The feeling of wonder that makes you ask "Why?" or "How?".
3	Experiment	C	The process of changing only one thing at a time to see its effect.
4	Curiosity	D	A controlled procedure to test a question, like frying dough at different temperatures.

Options
(a) 1-A, 2-B, 3-C, 4-D
(b) 1-C, 2-A, 3-D, 4-B
(c) 1-D, 2-C, 3-B, 4-A
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(b) 1-C, 2-A, 3-D, 4-B
Scientific investigation is a systematic process of inquiry. Observation is the first step where you notice phenomena. An experiment is a planned test to answer a question. Curiosity is the spark of wonder that begins all scientific exploration.

72. Match the physical phenomena with their correct examples or explanations.

	Column A		Column B
1	Force	A	Explains how corrective glasses help people see clearly.
2	Heating Effect of Current	B	Causes a ball thrown in the air to fall back to the ground.
3	Pressure Difference	C	Allows an electric room heater to keep us warm in winter.
4	Bending of Light	D	Leads to the formation of strong winds and sometimes cyclones.

Options
(a) 1-B, 2-C, 3-D, 4-A
(b) 1-C, 2-D, 3-A, 4-B
(c) 1-D, 2-A, 3-B, 4-C
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(a) 1-B, 2-C, 3-D, 4-A
Force is what makes objects change motion, like gravity pulling a ball down. The heating effect of current generates warmth in appliances. Air pressure differences cause wind. The bending (refraction) of light is how lenses in glasses work.

73. Match the substances with their correct classification or description.

	Column A		Column B
1	Microorganisms	A	A combination of substances that can be separated physically, like sugar in tea.

NODIA

2	Compound	B	A pure substance made of only one type of particle.
3	Element	C	Tiny organisms that can be both helpful, like in digestion, and harmful.
4	Mixture	D	Formed when two or more elements are chemically bonded together.

Options

(a) 1-D, 2-B, 3-A, 4-C
(b) 1-A, 2-C, 3-D, 4-B
(c) 1-C, 2-D, 3-B, 4-A
(d) 1-B, 2-A, 3-C, 4-D

Ans :

(c) 1-C, 2-D, 3-B, 4-A
Microorganisms are tiny living things that can be beneficial or cause infections. Compounds are made of multiple bonded elements. Elements are the purest form of substances. Mixtures are physical combinations of different substances.

74. Match the astronomical and Earth science concepts to their descriptions.

	Column A		**Column B**
1	Phases of the Moon	A	All living and non-living things interacting in an area, like a pond or forest.
2	Ecosystem	B	Shielding the planet from harmful ultraviolet rays from the Sun.
3	Earth's Atmosphere	C	The beautiful cycle caused by the changing illuminated part of the Moon we see.
4	Calendars	D	Systems for tracking time that were developed by observing celestial cycles.

Options

(a) 1-A, 2-C, 3-D, 4-B
(b) 1-C, 2-A, 3-B, 4-D
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-D, 2-B, 3-C, 4-A

Ans :

(b) 1-C, 2-A, 3-B, 4-D
The Moon's phases are due to its position relative to the Earth and Sun. An ecosystem includes all organisms and their environment. The atmosphere has a protective layer. Calendars were created based on cycles of the sun and moon.

75. Match the experimental step with its example from the "puri" investigation.

	Column A		**Column B**
1	A Controllable Factor	A	Measuring the time it takes for the puri to puff up.
2	An Observable Result	B	Using dough circles of the same thickness when testing different oil temperatures.
3	The Scientific Question	C	Using different types of flour (atta, maida) to make the puri.
4	Keeping Conditions Same	D	Why does a puri puff up and have one side thinner than the other?

Options

(a) 1-D, 2-B, 3-A, 4-C
(b) 1-B, 2-C, 3-D, 4-A
(c) 1-A, 2-D, 3-C, 4-B
(d) 1-C, 2-A, 3-D, 4-B

Ans :

(d) 1-C, 2-A, 3-D, 4-B
The type of flour is a factor you can intentionally change or control. The time taken to puff is a measurable result you observe. The "why" question is the starting point of the investigation. To test one factor, others must be kept constant.

TRUE AND FALSE

76. All microorganisms are harmful to humans and are primarily responsible for causing infections.

Ans :

False

Click Here to Buy book on Amazon

The chapter states that some microbes are "invisible helpers" that aid in digestion or help produce medicines, while others can be harmful.

77. The magnetic effect of an electric current is what allows motors and other machines to function.

Ans :

True
The text explains that society depends on the magnetic effect of electric current to help motors run and machines operate effectively.

78. Scientific forces are only capable of making objects accelerate or speed up.

Ans :

False
According to the text, forces are responsible for making objects speed up, slow down, or change their direction of motion.

Download INDIA's Best Study app NODIA

79. A significant difference in air pressure is required to create even a gentle breeze.

Ans :

False
The text clarifies that a small difference in air pressure can result in a gentle breeze, while stronger pressure differences can lead to powerful winds.

80. In solid materials, the tiny particles they are composed of are able to move around freely.

Ans :

False
The chapter explains that particles in a solid cannot move much, whereas particles in a gas can move around freely.

81. The Moon shines because it reflects the light from the Sun.

Ans :

True
The text states that it's not just polished mirrors that reflect light; rough surfaces and the Moon reflect light as well.

82. Early calendars were created by observing the cycles of the Moon and the movement of the Sun.

Ans :

True
By combining observations of sunrises, sunsets, and lunar cycles, humans were able to create the first calendars.

83. Human activities on the planet have no significant effect on the Earth's overall temperature and climate patterns.

Ans :

False
The text explicitly states that human activities can cause small changes in the Earth's temperature, which disrupts climate patterns with dangerous results.

84. To conduct a proper scientific experiment, it is best to change only one variable at a time.

Ans :

True
The text advises that in experiments, it is better to change only one thing at a time while keeping all other conditions the same for accurate results.

85. A proper science laboratory with specialized equipment is necessary to conduct any scientific experiment.

NODIA

Ans :

False
The chapter suggests that you don't need a fancy laboratory, noting that even a home kitchen is a wonderful place for observation and simple experiments.

86. Earth's atmosphere is crucial for life because it provides oxygen and shields the planet from harmful ultraviolet rays.

Ans :

True
The text highlights that Earth's atmosphere provides the oxygen we breathe and protects us by shielding against harmful ultraviolet rays.

87. Pressure describes how force is distributed over an object's area.

Ans :

True
The chapter introduces pressure as the concept of how force is distributed over an object, which helps explain phenomena like wind.

Download INDIA's Best Study app NODIA

88. The bending of light explains how corrective eyeglasses help people see more clearly.

Ans :

True
As stated in the text, the bending of light is the principle that explains how corrective glasses are able to help many people see clearly.

Download INDIA's Best Study app NODIA

89. An ecosystem only includes the relationships between different living organisms.

Ans :

False
The text defines ecosystems as the complex patterns of relationships between living organisms and their non-living environment, including air, water, and sunlight.

90. The scientific process behind why a puri puffs up when fried is a simple phenomenon that is completely understood by scientists today.

Ans :

False
The text reveals that even this simple, everyday observation is actually not yet completely understood by scientists today.

VERY SHORT QUESTIONS

91. What fundamental questions does the chapter say are the starting point for scientific discovery?

Ans :

The chapter states that science begins with wonder and simple questions about the world around us, such as "Why?" and "How?".

92. What is the primary purpose of the "Probe and ponder" questions in each chapter?

Ans :

The primary purpose of the "Probe and ponder" questions is not for exams but to spark curiosity and encourage exploration into science.

93. How does this book want you to learn, beyond just memorizing new facts?

Ans :

This book wants you to learn how to find new facts by engaging in the investigative process of science, not just memorizing them.

94. What does the image of a root on the left-hand pages symbolize?

Ans :

The image of a root symbolizes the deep, solid foundation of knowledge that connects us to our environment, traditions, and heritage.

95. What does the image of a kite on the right-hand pages represent?

Ans :

The image of a kite soaring in the sky represents the idea that curiosity must take flight for us to explore the unknown.

96. What does investigation in science mean, according to the chapter?

Ans :

According to the chapter, investigation in science means asking focused questions and designing simple experiments to find answers, improving your understanding through observation.

97. What role do microbes play in our health, as mentioned in the chapter overview?

Ans :

The chapter overview mentions that some microbes are invisible helpers that aid digestion, while others can be harmful by causing infections.

98. Name two effects of electric current that the chapter previews as topics for study.

Ans :

The chapter previews the study of the heating effect of electric current, which keeps us warm, and its magnetic effect, which helps motors run.

99. What concept is introduced to explain how force is distributed over an object?

Ans :

The concept of pressure is introduced to explain how a force is distributed over an object, which also helps in understanding air movement.

100. How are powerful weather events like cyclones linked to pressure?

Ans :

Downloaded from www.pdf.tube

The chapter explains that a strong pressure difference in the air can lead to strong winds and sometimes even powerful cyclones.

101. How does the movement of particles differ between solids and gases?

Ans :

In materials that are solid, the tiny particles they are made of cannot move much, while in gases, the particles can move around freely.

Download INDIA's Best Study app NODIA

102. What are the three classifications of materials mentioned in the chapter?

Ans :

The chapter mentions that materials can be classified into elements (pure substances), compounds (bonded elements), and mixtures (physically separable combinations).

103. What phenomenon explains how corrective glasses help many people see clearly?

Ans :

The bending of light as it passes through lenses is the phenomenon that explains how corrective glasses help many of us see clearly.

104. How did ancient humans use observations of the Moon to create early calendars?

Ans :

Ancient humans created the first calendars by watching the periodic cycles of the Moon's phases and combining them with observations of sunrises.

105. What forms the ecosystems that support life on our planet?

Ans :

Ecosystems are formed by the complex relationships between living organisms and their environments, including air, water, sunlight, and other organisms.

106. What makes Earth's distance from the Sun "just right" for life?

Ans :

Earth's distance from the Sun is "just right" because it allows water to remain in its liquid state, which is essential for life.

107. What is the first step in investigating a phenomenon like a puri puffing up?

Ans :

The first step is to ask a scientific question, such as what different things might change the way a puri puffs up when fried.

NODIA

108. What is the key principle to follow when conducting experiments with multiple variables?

Ans :

The key principle is to change only one thing at a time while keeping all other conditions the same for a fair comparison.

109. What example of a simple follow-up question is given after experimenting with a puri?

Ans :

A simple follow-up question provided is, "What happens if I prick a hole in the puri before frying it in oil?".

110. What is the main idea behind the term "systematic investigation"?

Ans :

The main idea of systematic investigation is the process of performing controlled experiments, from simple to complex, to understand a phenomenon.

111. How does the chapter suggest science evolves from each answer found?

Ans :

The chapter suggests science is always evolving because each answer discovered through investigation opens up a new set of questions for deeper exploration.

112. Explain the relationship between the symbols of the root and the kite.

Ans :

The root and kite symbols together invite you to stay grounded in real observations while allowing your creative ideas to soar towards new horizons.

113. Why is your kitchen considered a good place to conduct scientific observations?

Ans :

Your kitchen is considered a wonderful place for scientific observation because it allows you to observe everyday phenomena and ask curious questions.

114. What two fundamental aspects must an investigator balance in science?

Ans :

An investigator must balance the solid ground of careful observation with the freedom of creative thinking to make scientific progress.

115. What is the connection between the movement of air and the concept of pressure?

Ans :

The chapter explains that the movement of air, from a gentle breeze to a cyclone, is decided by differences in air pressure.

116. How does understanding forces help explain the motion of a thrown ball?

Ans :

Understanding forces helps explain why a ball thrown up into the air slows down, stops, and then falls back to the ground.

117. What example is used to illustrate how solutions are formed?

Ans :

The example used to illustrate how solutions are formed is the process of sugar dissolving in tea to make the entire drink sweet.

118. Why does the Moon appear to have different phases in the night sky?

Ans :

The Moon shows different phases because, depending on its position relative to the Earth and Sun, a different part of it is illuminated.

119. What dual role does Earth's atmosphere play in supporting life?

Ans :

Earth's atmosphere supports life by providing the oxygen we need to breathe and by shielding us from the Sun's harmful ultraviolet rays.

120. How can human activities pose a danger to Earth's climate?

Ans :

Human activities can cause small changes in Earth's temperature, which disrupts global climate patterns and leads to dangerous consequences for the planet.

121. Identify two variables you could change when experimenting with frying a puri.

Ans :

When experimenting with frying a puri, you could change variables such as the thickness of the rolled dough or use different types of flour.

Download INDIA's Best Study app NODIA

122. Identify two things you could measure or observe when frying a puri.

Ans :

When experimenting, you could observe whether the puri puffs up at all or measure the specific time it takes to puff up completely.

123. How could you test the effect of oil temperature on a puri scientifically?

Ans :

To test the effect of oil temperature, you would use dough circles of the same thickness and drop them in the same way.

124. Why is it important to keep notes of everything you see and sense?

Ans :

Keeping detailed notes of all observations is important because it helps in analyzing the results and may lead to more questions for investigation.

125. How does the chapter describe the transition from Grade 7 to Grade 8 science learning?

Ans :

The transition is described as moving from understanding that science evolves to actively entering the investigative world where wonder and evolution combine.

126. What is the relationship between living organisms and their environment called?

Ans :

The complex patterns of relationships between living organisms and their environments, which include air, water, and sunlight, are called ecosystems.

127. What is the human role in the problem and solution of climate change?

Ans :

Click Here to Buy book on Amazon

Humans are at the heart of the problem as we influence the climate, but we are also the solution through scientific understanding.

128. What do you need to start doing science in your kitchen?

Ans :

To start doing science in your kitchen, you simply need to begin with curiosity, conduct careful observations, and ask "what happens if...?" questions.

129. Why is the simple observation of a puri swelling scientifically interesting?

Ans :

The simple observation of a puri swelling is scientifically interesting because it is a common phenomenon that is not yet completely understood by scientists.

130. What is the overall goal of the investigative journey proposed in this chapter?

Ans :

The overall goal is to learn how to use questions as starting points to observe, experiment, and explain, becoming scientific investigators.

SHORT ANSWER QUESTIONS

131. Explain the learning journey through Grades 6, 7, and 8 as described in the chapter.

Ans :

The learning journey begins in Grade 6 by understanding that science starts with wonder and basic questions. In Grade 7, the focus shifts to how science is always evolving, with each answer leading to new questions. Finally, Grade 8 combines these ideas, guiding students into the investigative world of science to learn how to actively find new facts.

132. How does the chapter connect the study of forces to everyday phenomena and larger natural events?

Ans :

The chapter connects forces to everyday life by explaining how they make objects speed up, slow down, or change direction, like a car braking. It then scales this concept up to larger natural events by linking differences in air pressure—a result of forces—to the formation of gentle breezes, strong winds, and even destructive cyclones that impact our lives.

133. Why is it essential to zoom into materials to understand phenomena like boiling water?

Ans :

To truly understand why water boils at a certain temperature, one must zoom into its composition. The chapter explains that all materials are made of tiny particles. The movement of these particles, which differs between states like solids and gases, governs the material's properties. Therefore, observing particle behavior is essential for a deeper scientific understanding of everyday phenomena.

134. Explain how observing the Moon led to a significant development for human civilization.

Ans :

Observing the sky revealed that the Moon goes through beautiful, periodic phases as its illuminated portion changes nightly. Ancient humans combined their careful observations of these lunar cycles with the patterns of sunrises and sunsets. This systematic observation allowed them to develop the first calendars, a fascinating tool that links our daily routines on Earth to the motions of celestial objects.

135. Describe the dual challenge and responsibility humans face regarding Earth's climate.

Ans :

Humans face a dual challenge regarding Earth's climate. Our activities are causing small but dangerous changes in the planet's temperature, disrupting climate patterns. This makes us central to the problem. However, this also gives us the responsibility to be the solution. We must use science to understand these changes and guide our actions to protect the planet's delicate balance.

136. Summarize the key elements of a "systematic investigation" using the puri example.

Ans :

A systematic investigation, as shown with the puri example, involves a structured approach. It requires changing only one variable at a time, such as oil temperature, while keeping others

Downloaded from www.pdf.tube

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

like dough thickness constant. It also emphasizes the importance of keeping detailed notes of all observations and sensations, which can then be used to analyze the results and form new, more specific questions.

137. Why is it more important to learn "how to find new facts" than to "learn new facts"?

Ans :

Learning "how to find new facts" is more important because it empowers you to become an investigator, not just a passive learner. This approach, which involves questioning, observing, and experimenting, teaches the process of science itself. It equips you with the skills to explore real-world puzzles independently, making you a young scientist capable of discovery beyond the textbook.

138. Explain the relationship between the heating effect and magnetic effect of electric current mentioned in the text.

Ans :

The text introduces the heating and magnetic effects as two ways electric current improves our lives. The heating effect is used in appliances that keep us warm. The magnetic effect is fundamental to the operation of motors and machinery. While both originate from electric current, they represent different physical phenomena that have been harnessed for distinct technological applications to make our lives easier.

139. How does the chapter illustrate the concept of an ecosystem's complexity?

Ans :

The chapter illustrates ecosystem complexity by describing the marvellous and intricate patterns of relationships between all living things and their non-living environment. It emphasizes that every single organism, from the tiniest insect to the tallest tree, depends on and responds to air, water, and sunlight, as well as other organisms, forming the interconnected web of life on Earth.

140. Why must an investigator change only one thing at a time during an experiment?

Ans :

An investigator must change only one thing at a time to isolate its specific effect on the outcome. For example, to see how oil temperature affects a puri, you must use dough of the same thickness. If you changed both the oil temperature and dough thickness simultaneously, you wouldn't know which change caused the observed result, making the experiment inconclusive.

141. Describe the process a scientist might use to begin investigating why a puri puffs up.

Ans :

A scientist would begin by asking a focused question about what factors might influence the puffing. They would then identify things they can change or control, called variables. For the puri, this could include the thickness and size of the dough, the type of flour used, the temperature of the oil, or even how the dough is placed into the oil.

NODIA

142. How do the concepts of light reflection and refraction apply to everyday objects?

Ans :

The chapter explains that light reflection and refraction are key to understanding everyday objects. The bending of light, or refraction, through lenses is how corrective eyeglasses work. Reflection off curved mirrors explains the image seen in a shiny spoon. The text also notes that even rough surfaces and the Moon reflect light, which is why we can see them.

143. What are the two key roles of Earth's atmosphere that make life possible?

Ans :

Earth's atmosphere is crucial for life for two main reasons. First, it contains the oxygen that most living organisms, including humans, need to breathe and survive. Second, it acts as a protective shield, blocking harmful ultraviolet rays from the Sun that would otherwise be dangerous to life on the surface. These two functions together help create a habitable environment.

144. Explain why careful observation and creative thinking must be balanced in science.

Ans :

Science requires a balance between careful observation and creative thinking because they serve different, yet complementary, roles. Careful observation grounds investigations in reality and provides reliable data. Creative thinking allows scientists to form new hypotheses, design innovative experiments, and interpret data in

novel ways. Without this balance, ideas might lack evidence, or observations might lack insightful interpretation.

145. How does this chapter introduce the vast range of scientific inquiry, from the microscopic to the cosmic?

Ans :

The chapter introduces this vast range by taking the reader on a journey from the invisible world to the far reaches of space. It starts by examining a single drop of water to find hidden microbes and then expands outward to discuss planetary-scale challenges like climate change and the cosmic motions of the Sun and Moon that determine our calendars.

146. What steps are involved in the scientific process as outlined in the Grade 8 approach?

Ans :

The scientific process for Grade 8 involves several steps:

- Asking more focused questions beyond simple "why" and "how."
- Designing ways to conduct simple experiments to answer these questions.
- Using careful and thoughtful observation to gather information.
- Explaining clearly what is seen to improve overall understanding.

147. What is the significance of the root and kite symbols in the textbook's design?

Ans :

The significance of these symbols is to convey a core message about science:

- The root symbolizes the deep foundation of knowledge and connection to real observations.
- The kite symbolizes the need for curiosity and ideas to soar and explore the unknown.
- Together, they represent the balance between being grounded in evidence and having the creative freedom to seek new horizons.

148. List the diverse topics previewed in this chapter for the Grade 8 curriculum.

Ans :

The Grade 8 curriculum, as previewed in the chapter, includes these topics:

- The hidden world of microorganisms, both helpful and harmful.
- The heating and magnetic effects of electric current.
- Forces, pressure, and their connection to weather events.
- The particulate nature of matter in solids and gases.
- The properties of light, including reflection and refraction.
- The phases of the Moon and the creation of calendars.

149. What makes Earth a unique planet suitable for life, according to the text?

Ans :

The text highlights two key factors that make Earth suitable for life:

- Its perfect distance from the Sun, which allows water to exist in a liquid state.
- The presence of an atmosphere that provides breathable oxygen and protects the surface from harmful ultraviolet radiation.

150. What are the two distinct categories of things an investigator must consider before starting an experiment?

Ans :

Before starting an experiment, an investigator must consider two main categories:

- What factors can be changed or controlled during the experiment, known as variables.
- What factors can be observed or measured to see if the changes made a difference, known as outcomes or results.

151. How does the chapter suggest a simple question can lead to a scientific investigation?

Ans :

The chapter suggests that even a simple question a scientist might ask, like why one side of a puri is thinner, can be the starting point. This curiosity leads to a more scientific question about what factors influence the puffing. This transition from a simple "why" to a testable question is the first step in a formal scientific investigation.

152. What are the different ways materials around us can be classified?

Ans :

The chapter outlines the following ways materials can be classified:

Click Here to Buy book on Amazon

- As elements, which are pure substances.
- As compounds, where two or more elements are bonded together.
- As mixtures, which are combinations of substances that can be separated physically.
- By their state, such as solids where particles can't move much, or gases where they move freely.

153. Why is a kitchen considered a "wonderful place to observe"?

Ans :

The kitchen is called a wonderful place to observe because it's a real-world laboratory accessible to everyone. It is full of everyday phenomena, like a puri puffing up or dough rising, that can spark curiosity. All that is needed to begin investigating is careful observation and asking simple "what if" questions, without needing any fancy equipment.

154. What are some examples of real-world puzzles that young scientists can explore?

Ans :

The chapter suggests that young scientists can explore a range of real-world puzzles:

- Everyday life questions, such as why dough rises.
- Bigger mysteries of the Earth, such as whether the world is getting warmer.
- The incredible diversity of plants and animals around us.
- The reasons why a puri puffs up when placed in hot oil.

155. How are we, as humans, both the cause and solution to environmental problems?

Ans :

The chapter positions humans at the center of environmental issues. We are the problem because our activities influence Earth's climate. However, we are also the solution because we can and must use the principles of science like observing and experimenting. This scientific understanding is key to guiding our actions and protecting the delicate balance on which all life depends.

156. What advice does the chapter give for conducting a fair scientific test?

Ans :

The main advice for conducting a fair scientific test is to change only one variable at a time while keeping all other conditions the same. This method allows the investigator to be certain that any observed change in the outcome is due to the single factor that was altered, leading to a reliable and meaningful conclusion.

157. What is the connection between tiny particles and the properties of materials?

Ans :

The connection is that the properties of materials, like why water boils, are determined by the behavior of the tiny particles they are made of. In solids, these particles are restricted in movement, while in gases, they move freely. Understanding this particle-level behavior is crucial to explaining the observable characteristics and actions of different materials.

158. Summarize the journey of scientific topics presented in the chapter overview.

Ans :

The journey of topics begins with the unseen world of microbes and how our bodies fight infection. It then moves to physics, exploring electricity, forces, and pressure, linking them to weather. Next, it delves into chemistry, looking at particles, elements, and solutions. The focus then shifts to light, optics, and astronomy, before concluding with ecology and the environmental challenges facing our planet.

159. What is the process for asking a scientific question from an everyday observation?

NODIA

Ans :

The process involves these steps:

- Start with a simple observation, like a puri puffing up.
- Ask a basic "why" question that a curious person might ask.
- Refine this into a more specific, scientific question that can be investigated.
- Focus the question on what factors could potentially change the outcome of the observation.

160. What are some potential variables one can control or change in the puri experiment?

Ans :

The chapter suggests several variables that can be controlled:

- The thickness and the size of the rolled dough.

- The type of flour being used, for example, atta or maida.
- The temperature of the hot oil used for frying.
- The way the rolled dough is dropped into the oil, such as vertically or at an angle.

LONG ANSWER QUESTIONS

161. Describe the complete, step-by-step process of scientific investigation as illustrated by the example of frying a puri.

Ans :

The process of scientific investigation, using the puri example, involves the following key steps:

- Begin with a simple observation and ask a question a scientist might ask, like "why does a puri puff up?".
- Formulate a more specific, testable question about what factors could change how it puffs.
- Identify what you can change (variables like dough thickness or oil temperature) and what you will observe (outcomes like puffing time).
- Design an experiment where you change only one variable at a time, keeping others constant to ensure a fair test.
- Carefully record all observations, smells, and sounds in a notebook during the experiment.
- Use the results to answer the initial question and to think of new questions for further investigation.

162. Explain the metaphor of the "root" and the "kite" in detail, and describe how they represent the dual nature of scientific work.

Ans :

The metaphor of the root and kite represents the essential dual nature of scientific work.

- The root, found on the left-hand pages, symbolizes the deep, solid foundation of science. It represents being grounded in existing knowledge, traditions, and, most importantly, careful, real-world observations.
- The kite, soaring on the right-hand pages, symbolizes the need for curiosity, imagination, and creative thinking to take flight. It represents exploring new ideas, asking bold questions, and soaring towards the unknown.
- The balance is crucial. Science works best only when the solid ground of careful observation is combined with the freedom of creative thinking. One without the other is incomplete.

163. Summarize the broad range of scientific concepts introduced in the chapter, from microbes to planetary systems, explaining their interconnected ness.

Ans :

The chapter presents a journey through interconnected scientific concepts, starting with the microscopic and ending with the planetary.

- It begins with microbes, which affect our health, and moves to physics concepts like forces and pressure.
- These forces are then shown to be connected to large-scale weather phenomena like cyclones.
- To understand pressure, we must zoom into the tiny particles that make up materials like air.
- This leads to chemistry, exploring how particles form elements, compounds, and mixtures.
- Finally, the chapter connects us to Earth's ecosystems and our place in the solar system, showing how human activities impact the delicate balance of our planet.

164. Based on the text, outline a plan for a simple experiment a student could design in their kitchen to test a hypothesis.

Ans :

A student could design an experiment to test the hypothesis that the thickness of dough affects how well a puri puffs up.

- **Question** : Does a thicker puri puff up differently than a thinner puri?
- **Variables** : The controlled variable is the thickness of the rolled dough. One batch will be rolled thin, and another thick.
- **Constants** : To make it a fair test, other factors must be kept the same : use the same flour type, the same oil at the same temperature, and drop the dough into the oil in the same manner.
- **Observation** : The student would observe and measure the outcome, such as whether each puri puffs up (yes/no) and how long it takes in seconds.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

- **Conclusion** : By comparing the results, the student can determine if thickness had a noticeable effect on the puri puffing.

165. Explain how science is portrayed as an evolving and investigative process, rather than a static collection of facts, in this chapter.

Ans :

The chapter portrays science as a dynamic journey, not a destination.

- It begins by establishing that science starts not with answers, but with simple, curious questions.
- It emphasizes that science is always evolving; in Grade 7, students learned that each answer opens up new questions, preventing knowledge from being static.
- For Grade 8, the focus shifts to the "Investigative World of Science," where students are encouraged to actively find new facts, not just learn them.
- Investigation is defined as more than just looking; it involves focused questions, designing experiments, and using observations to refine understanding, highlighting a continuous, hands-on process.

166. Describe the logical progression of topics in physics as outlined in the chapter, from forces to weather.

Ans :

The chapter outlines a clear logical progression for the study of physics concepts.

- It starts with the fundamental concept of forces, explaining how they cause changes in motion, like a car stopping.
- From force, it logically introduces the idea of pressure, which is how a force is distributed over an area.
- The concept of pressure is then directly applied to explain how air moves, linking the abstract idea to a tangible phenomenon.
- Finally, this progression culminates in explaining large-scale weather events, showing how a small difference in pressure creates a breeze, while a strong difference can lead to powerful cyclones.

167. How does the chapter connect the study of light with astronomy and the development of human civilization?

Ans :

The chapter creates a fascinating link between the physics of light, astronomy, and human history.

- It begins by explaining how light behaves, such as reflecting off mirrors and rough surfaces.
- It extends this principle to a celestial body, explaining that the Moon is visible because it reflects sunlight.
- This leads to astronomy, describing how the changing relative positions of the Earth, Moon, and Sun cause the observed phases of the Moon.
- This ties into human civilization, as the careful, systematic observation of these predictable lunar cycles allowed ancient people to create the very first calendars to organize their lives.

NODIA

168. Discuss the critical role of the Earth's environment in supporting life and the urgent challenges it faces from human activity.

Ans :

The chapter emphasizes the environment's critical role and the challenges it faces.

- Earth is 'just right' for life primarily due to its environment : a perfect distance from the Sun allowing for liquid water, and an atmosphere with oxygen that also shields from UV rays.
- This delicate balance is under threat from human activities, which are causing small changes in Earth's temperature and disrupting climate patterns with dangerous consequences.
- The urgent challenge is that we are both the problem and the solution.
- The solution requires us to apply scientific principles observing, measuring, and experimenting to understand the changes and guide our actions to protect the planet.

169. Explain why a kitchen can be considered a scientist's laboratory for learning the principles of systematic investigation.

Ans :

A kitchen is an ideal introductory laboratory for several reasons.

- **Accessibility** : Unlike a formal lab, a kitchen is a familiar and accessible place where science is already happening in everyday tasks like cooking.
- **Observation Opportunities** : It is full of observable phenomena, like a puri puffing or

dough rising, that naturally spark curiosity and scientific questions.

- **Simplicity** : A student only needs curiosity and the willingness to ask "what happens if...?" to begin; no fancy equipment is required.
- **Teaches Control** : It allows for practicing systematic investigation, such as changing one ingredient (variable) at a time while keeping others constant to observe the effect, which is a core scientific principle.

Download INDIA's Best Study app NODIA

170. Imagine you are designing an experiment to test if the type of flour affects a puri. Detail your experimental plan based on the chapter's guidelines.

Ans :

Following the chapter's guidelines, my experimental plan would be as follows:

- **Scientific Question** : Does using whole wheat flour (atta) versus refined flour (maida) affect how a puri puffs up?
- **Variable** : The single variable to be changed is the type of flour used to make the dough.
- **Constants** : To ensure a fair test, all other conditions will be kept the same for both types of flour. This includes using the same amount of water, the same dough thickness, the same oil temperature, and dropping them into the oil in the same way.
- **Procedure** : I will prepare two batches of dough, one with atta and one with maida. I will fry one puri from each batch under identical conditions.
- **Observation** : I will record if each puri puffs up, how much it puffs, and the time it takes.
- **Repetition** : I will repeat the process multiple times for reliability and then compare the average results to draw a conclusion.

CASE BASED QUESTIONS

171. A student named Rohan notices that some moong dal seeds sprout faster than others and wonders if sunlight is the reason. He places one bowl of seeds on a sunny windowsill and another identical bowl in a dark cupboard, ensuring both have the same amount of water. He observes them daily for a week to see which sprouts first and grows taller.

Questions:

1. What was the main question Rohan wanted to investigate?
2. What factors did Rohan keep the same in both setups to ensure a fair experiment?
3. Why was it important for Rohan to have one bowl in the dark and one in the sun, rather than just observing one bowl?

Ans :

1. Rohan wanted to investigate if sunlight affects the speed at which moong dal seeds sprout.
2. He used identical bowls and the same amount of water for both setups.
3. Having two setups allows for comparison. The bowl in the dark acts as a control, helping him conclude whether sunlight was the specific factor causing the difference in sprouting.

172. Aisha wants to see what makes ice melt faster. She takes two identical ice cubes. She places one on a metal plate and the other on a plastic plate, leaving them in the same room. She observes that the ice on the metal plate melts much quicker than the one on the plastic plate, even though both plates were at the same room temperature.

Questions:

1. What was the purpose of Aisha's investigation?
2. In this experiment, what was the one thing Aisha changed between the two setups (the variable)?
3. Based on her observation, what initial conclusion can Aisha draw about the two materials?

Ans :

1. The purpose was to investigate what factors affect the melting speed of ice.
2. Aisha changed the material of the plate the ice was placed on (metal vs. plastic).
3. Aisha can conclude that metal causes ice to melt faster than plastic, suggesting it transfers heat more effectively.

173. A baker explains to students that science is everywhere, even in the kitchen. To investigate why dough rises, the baker prepares two batches of dough with the same flour, water, and sugar. In one batch, yeast is added, but not in the other. Both are kept in a warm place. The students observe that only the dough with yeast puffs up significantly.

Click Here to Buy book on Amazon

Questions:

1. According to the chapter, what is the first step of a scientific investigation that this scenario demonstrates?
2. What was the variable that the baker changed between the two batches of dough?
3. Why was it necessary to have a batch of dough without yeast?

Ans :

1. The first step demonstrated is asking a scientific question : "Why does dough rise?".
2. The variable was the presence or absence of yeast.
3. The batch without yeast served as a control group, allowing the students to confirm that yeast was the specific ingredient responsible for making the dough rise.

174. Priya wonders if hot water dissolves sugar faster than cold water. She takes two identical glasses and pours an equal amount of hot water into one and cold water into the other. She then adds one teaspoon of sugar to each glass and stirs them in the same way. She carefully notes the time it takes for the sugar to completely disappear in each glass.

Questions:

1. What question is Priya trying to answer with her experiment?
2. What should Priya observe or measure to get the answer to her question?
3. Why is it important for Priya to use the same amount of water and sugar in both glasses?

Ans :

1. Priya is trying to answer if water temperature affects how fast sugar dissolves.
2. She should measure the time it takes for the sugar to dissolve completely in each glass.
3. Using the same amount of water and sugar ensures that the only significant difference (variable) is the water temperature, making it a fair and controlled test.

175. A science teacher uses the analogy from the chapter to explain the scientific process. She says, "Your observations of the world are like the roots of a tree, keeping you grounded in reality. Your creative ideas and questions are like a kite, soaring to explore new possibilities." She emphasizes that a good scientist needs both to make discoveries and truly understand the world.

Questions:

1. In the teacher's analogy, what do the "roots" symbolize in science?
2. What does the "soaring kite" represent in the scientific process?
3. Why does the chapter suggest that both "roots" and a "kite" are necessary for scientific investigation?

NODIA

Ans :

1. The "roots" symbolize careful, real-world observations that form the foundation of scientific knowledge.
2. The "soaring kite" represents creative thinking, curiosity, and the new ideas or questions that drive exploration.
3. Both are necessary because science requires being grounded in factual evidence (observation) while also having the freedom to think creatively and form new hypotheses to test.

176. A group of students wants to explore what causes iron to rust. They place one iron nail in a test tube with plain water, another in a test tube with salty water, and a third nail is kept dry in an empty test tube. All three test tubes are left open to the air. They check the nails every day for a week.

Questions:

1. What phenomenon are the students investigating?
2. Identify the different conditions (variables) the students are testing.
3. Why did the students include a dry nail in their experiment? What is its purpose?

Ans :

1. The students are investigating the conditions that cause iron to rust.
2. The variables they are testing are the presence of plain water and the presence of salty water, compared to a dry condition.
3. The dry nail serves as a control. It helps them determine if water is a necessary component for rust to form by providing a baseline for comparison.

177. Arjun wonders if the surface a ball is dropped on affects how high it bounces. He takes a tennis ball and drops it from a height of one meter onto three different surfaces : a concrete floor, a grassy lawn, and a sandy pit. He asks his friend to record the height of the first bounce for each surface to compare the results.

Questions:

1. What is the scientific question Arjun is investigating?
2. What is the key variable Arjun is changing, and what is he measuring?
3. Why is it important for Arjun to drop the ball from the same height each time?

Ans :

1. Arjun is investigating whether the type of surface affects the bounce height of a ball.
2. He is changing the surface (concrete, grass, sand) and measuring the height of the first bounce.
3. Dropping the ball from the same height makes it a controlled variable. This ensures the test is fair, so any difference in bounce height is due to the surface, not the drop height.

178. Sarah notices her houseplant's leaves are drooping. She waters it and the next day, the leaves are upright again. This sparks her curiosity about how much water is best. She gets three identical small plants. She gives one plant no water, the second plant a small amount daily, and the third a large amount daily, observing them for a week.

Questions:

1. What everyday observation led to Sarah's scientific investigation?
2. To make this a fair test, what factors must Sarah keep the same for all three plants?
3. Why is using three plants with different watering levels better than just observing one plant?

Ans :

1. Observing her drooping plant perk up after watering led to her investigation.
2. She must keep the type and size of the plant, the pot, the amount of soil, and the amount of sunlight the same for all three plants.
3. Using three plants allows for comparison between different conditions, including a control (no water), to determine the effect of varying amounts of water on the plant's health.

179. Inspired by the chapter, Ali decides to systematically investigate what makes a puri puff up. He decides to test the effect of the oil's temperature. He prepares several identical rolled dough circles. He heats oil to a high temperature and fries one puri. Then he lets the oil cool down a bit and fries another, keeping detailed notes for comparison.

Questions:

1. What specific variable from the chapter's example is Ali investigating?
2. According to the principles of scientific investigation, why was it important for Ali to use identical dough circles?
3. Besides observing if the puri puffs up, what else could Ali measure or record in his notes to make his investigation more detailed?

Ans :

1. Ali is investigating the effect of the oil's temperature.
2. Using identical dough circles ensures that any difference in puffing is due to the oil temperature, not the dough's thickness or size.
3. He could measure the time it takes for the puri to puff up, the maximum height it puffs, or describe the texture and color after frying for each temperature.

180. A group of friends wants to find the best design for a paper airplane. They each fold a different design using the same type of paper. They go to an open field and, one by one, throw their planes from the same starting line with similar force. They use a measuring tape to see which plane travels the farthest before landing.

Questions:

1. What is the main investigative question of the friends' experiment?
2. What is the variable the friends are changing, and what are they measuring to determine the "best" design?
3. What other factors should the friends try to keep the same to make their test as fair as possible?

Ans :

1. The main question is which paper airplane design flies the farthest.
2. They are changing the design of the airplane and measuring the distance it travels.
3. They should try to keep the type of paper, the throwing force, the starting point, and the weather conditions (like wind) the same for each throw.

NODIA

Download INDIA's Best Study app NODIA

181. A student starts by asking a simple question, "Why do leaves fall from trees in autumn?" After some research, her question evolves to be more focused : "How do trees know when to drop their leaves?" Then, she refines it even further to an investigative question : "What chemical changes inside the leaf cause it to detach from the stem?"

Questions:

1. What key idea about science, mentioned in the chapter, does this scenario illustrate?
2. How do the student's questions become more scientific as they evolve?
3. Why is it important in science for questions to evolve and become more specific?

Ans :

1. This scenario illustrates that science is always evolving, and each answer can open up new, more focused questions.
2. The questions move from a general "Why?" to a more specific "How?" and finally to a question about the underlying mechanism ("What chemical changes?").
3. Specific questions are easier to investigate and test through experiments, leading to a deeper and more precise understanding of a phenomenon.

182. The chapter introduces the idea that science helps us explore an "invisible world." A student, curious about this, takes a drop of pond water and looks at it under a microscope. He is amazed to see tiny creatures swimming around, which were completely invisible to his naked eye. This experience helps him understand the importance of scientific tools for investigation.

Questions:

1. What "investigative world" did the student begin to explore?
2. What scientific tool allowed the student to see things that were previously invisible to him?
3. How does this experience demonstrate the importance of tools in scientific discovery?

Ans :

1. The student began to explore the hidden world of tiny organisms (microbes).
2. A microscope allowed him to see these invisible creatures.
3. It shows that scientific tools extend our senses, allowing us to observe and investigate parts of the natural world that are beyond our direct perception, which leads to new discoveries.

183. After a rain shower, a student observes that a puddle on the sunny part of the pavement dries up much faster than a puddle in the shade. To investigate this scientifically, he pours an equal amount of water onto two identical tiles, places one in direct sunlight and one in the shade, and checks them every 15 minutes to see which dries first.

Questions:

1. What everyday observation sparked this scientific investigation?
2. To conduct a fair experiment, what variables did the student need to keep constant for both tiles?
3. This simple experiment helps demonstrate what scientific process?

Ans :

1. The observation that a puddle in the sun dries faster than one in the shade sparked the investigation.
2. The student needed to keep the amount of water and the type/size of the tile constant for both setups.
3. This experiment demonstrates the process of evaporation and how it is affected by an external factor like heat from the sun.

184. A student wants to investigate what affects how fast a pendulum swings. She creates a pendulum using a string and a weight. First, she tests strings of different lengths while keeping the weight the same. Then, she uses the same length of string but tests different weights. She carefully counts the number of swings in 30 seconds for each setup.

Questions:

1. What two factors (variables) is the student testing?
2. How does the student apply the principle of "changing only one thing at a time" in her investigation?
3. Why is counting the swings over a fixed time period a good way to measure the "speed" of the swing?

Ans :

1. The student is testing the effect of the string's length and the weight's mass on the pendulum's swing rate.
2. She applies this by first changing only the length while keeping the weight constant, and

Downloaded from www.pdf.tube

then changing only the weight while keeping the length constant.

3. It provides a standardized way to compare the different setups. A higher number of swings in the same amount of time means a faster pendulum.

185. Two students are given the same science problem. Student A reads the textbook chapter, memorizes the facts, and answers the questions. Student B reads the chapter but also forms her own "what if" questions. She then tries a simple experiment at home related to the topic, makes careful observations, and discusses her surprising results with her teacher, demonstrating an investigative mindset.

Questions:

1. Which student is acting more like an "investigator" as described in the chapter?
2. What actions did Student B take that go beyond just learning facts?
3. Why is Student B's approach more aligned with the "heart of how science works"?

Ans :

1. Student B is acting more like an investigator.
2. Student B formed her own questions, designed and conducted a simple experiment, made careful observations, and discussed her findings.
3. Her approach is more aligned with the heart of science because it involves active curiosity, hands-on exploration, and drawing conclusions from evidence, rather than passively accepting facts.

****

NODIA

CHAPTER 2

THE INVISIBLE LIVING WORLD : BEYOND OUR NAKED EYE

SUMMARY

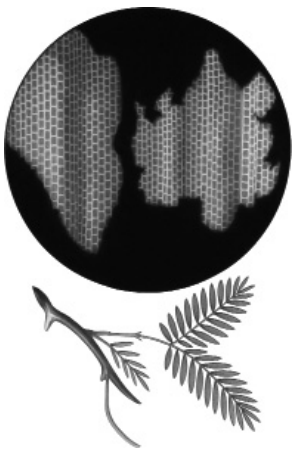
1. DISCOVERING THE INVISIBLE WORLD

1.1 The First Glimpses

For a long time, the world of tiny living things was unknown because they are too small for the naked eye to see. The invention of lenses, and later the microscope, opened up this hidden world filled with tiny creatures.

1.2 Pioneers of Microbiology

Robert Hooke (1665) Observed a thin slice of cork under his microscope. He saw that it was made of many small, box-like compartments, which he named "cells".This was the first time the word 'cell' was used to describe the basic unit of life. (See Figure : Cork cells)



Cork cells as published in the Micrographia

Antonie van Leeuwenhoek (1660s) : Built more powerful microscopes. He was the first person to see and describe living microorganisms like bacteria. He is known as the "Father of Microbiology".

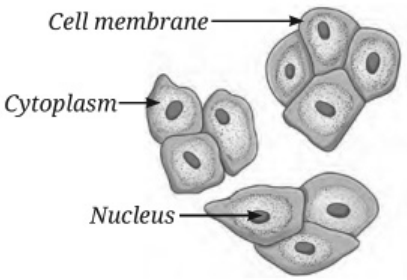
2. THE CELL : BASIC UNIT OF LIFE

2.1 What is a Cell?

All living beings, both plants and animals, are made up of cells. The cell is the basic structural and functional unit of life.

2.2 Basic Parts of a Cell

Almost all cells have three main parts:



Mount of human cheek cells

1. **Cell Membrane :** The thin outer layer that encloses the cell. It is porous, allowing essential materials to enter and waste to exit.
2. **Nucleus :** A round structure, usually in the center, that acts as the cell's "control center." It regulates all cell activities.
3. **Cytoplasm :** A jelly-like substance that fills the space between the nucleus and the cell membrane. Most of the cell's life processes happen here.

2.3 Comparing Plant and Animal Cells

Feature	Animal Cell	Plant Cell
1.	Cell Wall	Absent
2.	Chloroplasts	Absent
3.	Vacuole	Usually absent, or very small if present.

Click Here to Buy book on Amazon

2.4 Cell Diversity and Levels of Organisation

1. Shape and Function : Cells come in many shapes and sizes (e.g., long and branched nerve cells, spindle-shaped muscle cells). A cell's shape is directly related to its specific function.
2. Levels of Organization : In complex organisms, cells are organized in levels:
   (i) **Cells :** Basic units.
   (ii) **Tissues :** Groups of similar cells working together.
   (iii) **Organs :** Different tissues combined to perform a function (e.g., the stomach).
   (iv) **Organ Systems :** Several organs working together (e.g., the digestive system).
   (v) **Organism :** The complete living being.

3. MICROORGANISMS (MICROBES)

3.1 What are Microbes?

Microorganisms are living beings that are too small to be seen without a microscope. They are found everywhere : in soil, water, air, and even inside our bodies.

1. Unicellular : Organisms made of a single cell (e.g., Bacteria, Amoeba).
2. Multicellular : Organisms made of many cells (e.g., some fungi and algae).

3.2 Major Groups of Microbes

The main categories are bacteria, fungi, protozoa, and some algae. Viruses are also microscopic but are different because they are acellular(not made of cells) and can only reproduce inside a living host cell.

3.3 The Role of Microbes in Our World

Microorganisms can be both helpful and harmful.

3.3.1 Helpful Microbes

1. **Decomposers :** Bacteria and fungi break down dead plants, animals, and waste into simple, nutrient-rich manure. This cleans the environment and recycles nutrients back into the soil.
2. **In Food Production Yeast (Fungus) :** Used in baking. It releases carbon dioxide gas, which makes dough for bread, cakes and bhaturas rise and become fluffy.
3. **Lactobacillus (Bacteria) :** Ferments milk to make curd by producing lactic acid. It requires warm temperatures to grow well.
4. **In Agriculture :**
   (i) Rhizobium (Bacteria) : Lives in the roots of legume plants (like peas and beans) and "fixes" nitrogen from the air into the soil, acting as a natural fertiliser.
   (ii) Oxygen Production : Micro algae(like Spirulina) are microscopic plant-like organisms that produce more than half of the Earth's oxygen through photosynthesis. They are also used as a source of food and health supplements.

3.3.2 Harmful Microbes

Some microbes are harmful and cause food to spoil. Others can cause diseases in plants, animals, and humans. (This will be covered in the next chapter).

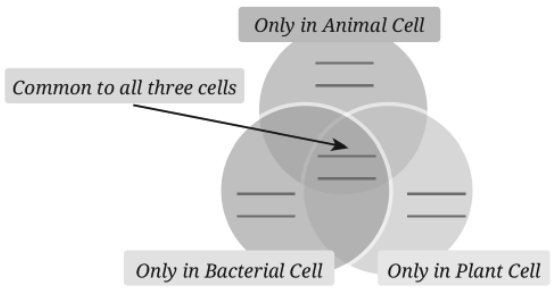
4. A QUICK COMPARISON OF CELL STRUCTURES

Feature	Animal Cell	Plant Cell	Bacterial Cell
1.	Cell Wall	No	Yes (provides rigidity)
2.	Well-defined Nucleus	Yes	Yes
3.	Chloroplasts	No	Yes(for photosynthesis)

NODIA

NCERT EXERCISE

1. Various parts of a cell are given below. Write them in the appropriate places in the following diagram.
Nucleus, Cytoplasm, Chloroplast, Cell wall, Cell membrane, Nucleoid



Ans :

The cell parts are placed in the diagram as follows:

1. Common to Bacterial, Plant and Animal Cells:
   - Cell membrane
   - Cytoplasm
2. Common to Plant and Animal Cells only:
   - Nucleus
3. Common to Plant and Bacterial Cells only:
   - Cell wall
4. Only in Plant Cell:
   - Chloroplast
5. Only in Bacterial Cell:
   - Nucleoid
6. Only in Animal Cell:
   - None of the given parts are exclusive to animal cells

2. Aanandi took two test tubes and marked them A and B. She put two spoonfuls of sugar solution in each of the test tubes. In test tube B, she added a spoonful of yeast. Then she attached two incompletely inflated balloons to the mouth of each test tube. She kept the set-up in a warm place, away from sunlight.

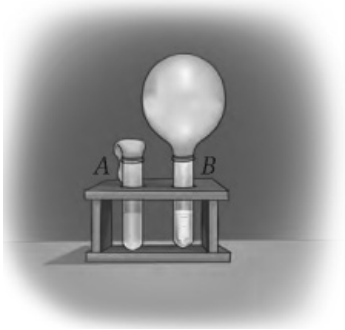
(i) What do you predict will happen after 3-4 days? She observed that the balloon attached to test tube B was inflated. What can be a possible explanation for this?

(a) Water evaporated in test tube B and filled the balloon with the water vapour.

(b) The warm atmosphere expanded the air inside the test tube B, which inflated the balloon.

(c) Yeast produced a gas inside the test tube B which inflated the balloon.

(d) Sugar reacted with warm air, which produced gas, eventually inflating the balloon.



Experimental set-up

(ii) She took another test tube, 1/4 filled with lime water. She removed the balloon from test tube B in such a manner that the gas inside the balloon did not escape. She attached the balloon to the test tube with lime water and shook it well. What do you think she wants to find out?

Ans :

(i) The correct explanation is (c) Yeast produced a gas inside the test tube B which inflated the balloon. Yeast is a microorganism that feeds on sugar. In a warm environment, yeast respires and breaks down the sugar, releasing carbon dioxide gas in the process. This gas fills the balloon and inflates it. No such reaction occurs in test tube A as there is no yeast.

(ii) She wants to test the identity of the gas produced by the yeast. Lime water turns milky in the presence of carbon dioxide. By passing the gas from the balloon through lime water, she wants to find out if the gas produced during fermentation is carbon dioxide.

3. A farmer was planting wheat crops in his field. He added nitrogen-rich fertiliser to the soil to get a good yield of crops. In the neighbouring field, another farmer was growing bean crops, but she preferred not to add nitrogen fertiliser to get healthy crops. Can you think of the reasons?

Ans :

The farmer growing bean crops did not need to add nitrogen fertiliser for the following reason:
Bean plants are legumes. The roots of leguminous plants have nodules that contain Rhizobium bacteria. These bacteria have the ability to take nitrogen gas directly from the atmosphere and convert it into a usable form for the plant. This process, called nitrogen fixation, naturally enriches the soil with nitrogen. Wheat crops, on the other hand, cannot fix atmospheric nitrogen and must absorb it from the soil, which is why the other farmer needed to add nitrogen-rich fertiliser.

4. Snehal dug two pits, A and B, in her garden. In pit A, she put fruit and vegetable peels and mixed it with dried leaves. In pit B, she dumped the same kind of waste without mixing it with dried leaves. She covered both the pits with soil and observed after 3 weeks. What is she trying to test?

Ans :

Snehal is trying to test the effect of adding dried leaves on the rate of decomposition of organic waste. Microorganisms require optimal conditions

Downloaded from www.pdf.tube

of moisture and air to break down waste into manure. By adding dried leaves in pit A, she is changing the conditions of the mixture, possibly improving air circulation. She is trying to find out if this addition helps the microorganisms to decompose the waste faster or more effectively compared to pit B, which does not contain dried leaves.

5. Identify the following microorganisms:
(i) I live in every kind of environment, and inside your gut.
(ii) I make bread and cakes soft and fluffy.
(iii) I live in the roots of pulse crops and provide nutrients for their growth.

Ans :

(i) Bacteria : Bacteria are found in almost every environment, and some types live in the human gut, aiding in digestion.
(ii) Yeast : Yeast is a fungus used in baking. It releases carbon dioxide during respiration, which makes the dough for bread and cakes rise, resulting in a soft and fluffy texture.
(iii) Rhizobium : This bacterium lives in the root nodules of leguminous plants (pulse crops) and fixes atmospheric nitrogen, providing essential nutrients for the plant's growth.

6. Devise an experiment to test that microorganisms need optimal temperature, air, and moisture for their growth.

Ans :

Aim : To show that microorganisms need warmth, air, and moisture to grow.
Materials : Four slices of bread, water, four zip-lock bags or containers.
Procedure:
1. Sample A (Moisture test) : Take a slice of bread and keep it dry. Place it in a bag and keep it in a warm place.
2. Sample B (Air test) : Moisten a slice of bread with water. Place it in a bag, remove as much air as possible, and seal it tightly. Keep it in a warm place.
3. Sample C (Temperature test) : Moisten a slice of bread with water. Place it in a bag with some air and keep it in a refrigerator.
4. Sample D (Control) : Moisten a slice of bread with water. Place it in a bag, leaving some air inside, and keep it in a warm place.
5. Observe all four slices for a few days.

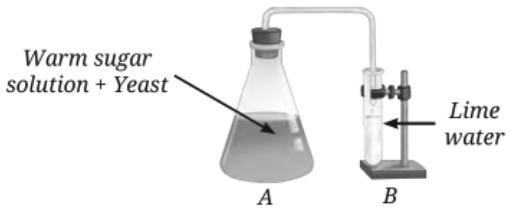
Observation and Conclusion : Fungal growth (mould) will be observed most clearly on slice D, which had moisture, air, and a warm temperature. Little or no growth will be seen on slices A (no moisture), B (no air), and C (low temperature). This proves that microorganisms require optimal moisture, air, and temperature for growth.

7. Take 2 slices of bread. Place one slice in a plate near the sink. Place the other slice in the refrigerator. Compare after three days. Note your observations. Give reasons for your observations.

Ans :

Observations : After three days, the slice of bread placed near the sink will show patches of cotton-like growth, which may be white, green, or black in colour. This is bread mould. The slice of bread kept in the refrigerator will show no such growth and will appear unchanged.
Reasons : Microorganisms like bread mould are present in the air. The area near the sink is warm and moist, providing favorable conditions for these microbes to land on the bread and grow rapidly. The refrigerator has a very low temperature, which inhibits the growth of microorganisms. Therefore, mould does not grow on the bread slice kept inside it.

8. Observe the set-up given in figure and answer the following questions.



Experimental set-up

(i) What happens to the sugar solution in flask A?
(ii) What do you observe in test tube B after four hours? Why do you think this happened?
(iii) What would happen if yeast was not added in flask A?

Ans :

(i) The yeast in flask A will act on the sugar solution. Through the process of fermentation, the yeast will break down the sugar into alcohol and carbon dioxide gas to get energy.
(ii) After four hours, the lime water in test tube B will turn milky. This happens because the carbon dioxide gas produced by the yeast

NODIA

in flask A travels through the delivery tube and bubbles into the lime water. Lime water chemically reacts with carbon dioxide and turns milky, confirming the presence of this gas.

(iii) If yeast was not added to flask A, the process of fermentation would not occur. No carbon dioxide gas would be produced. As a result, there would be no change in test tube B, and the lime water would remain clear.

9. A student observes that when curd is left out for a day, it becomes more sour. What can be two possible explanations for this observation?

Ans :

Two possible explanations for the curd becoming more sour are:

1. Curd contains the bacterium Lactobacillus. When left out at room temperature, which is warm, these bacteria multiply rapidly. They ferment more of the milk sugar (lactose) into lactic acid. An increased amount of lactic acid makes the curd taste more sour.
2. Other acid-producing microorganisms from the surrounding air could have contaminated the curd. These microbes also grow well at room temperature and produce acidic waste products, which would contribute to the increased sourness of the curd.

MULTIPLE CHOICE QUESTION

10. Who is known as the "Father of Microbiology" for being the first person to clearly see and describe tiny living things like bacteria?

(A) Antonie van Leeuwenhoek
(B) Robert Hooke
(C) Edward Jenner
(D) Ananda Mohan Chakrabarty

Ans :

(A) Antonie van Leeuwenhoek
Antonie van Leeuwenhoek, a Dutch scientist from the 1660s, developed superior lenses for his microscopes. This allowed him to be the first to observe and provide detailed descriptions of microorganisms, including bacteria and blood cells, earning him this title.

11. What did Robert Hooke name the small, empty spaces he observed in a thin slice of cork?

(A) Organisms
(B) Cells
(C) Tissues
(D) Microbes

Ans :

(B) Cells
When Robert Hooke examined cork under his microscope, the small, box-like compartments reminded him of a honeycomb or the small rooms in a monastery. He called these individual units "cells," marking the first use of this term in a biological context.

12. Why does a round-bottom flask filled with water make the letters on a book appear larger?

(A) The flask's glass changes the color of the letters.
(B) The water absorbs ink, causing the letters to spread.
(C) The flask filled with water acts like a magnifying lens.
(D) The paper gets wet and the fibers begin to expand.

Ans :

(C) The flask filled with water acts like a magnifying lens.
The curved shape of the round-bottom flask, when filled with water, causes light rays passing through it to bend. This bending of light, known as refraction, magnifies the image of the letters, making them appear larger to the observer.

13. When preparing a microscope slide of an onion peel, why is safranin stain added?

(A) To prevent the delicate cells from drying out too quickly.
(B) To make the plant cells stick more firmly to the glass slide.
(C) To kill any harmful bacteria that might be on the onion peel.
(D) To give the cells a pinkish colour so they can be seen clearly.

Ans :

(D) To give the cells a pinkish colour so they can be seen clearly.
Biological cells and their components are often transparent, making them difficult to see under a microscope. Adding a stain like safranin imparts color to the cell structures, increasing the contrast and making them much more visible for observation.

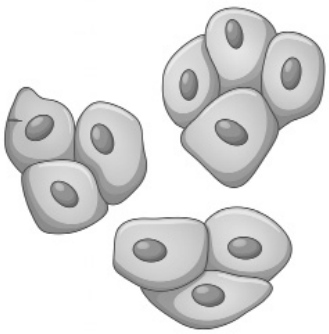
Click Here to Buy book on Amazon

14. What is a key structural feature present in an onion peel cell but absent in a human cheek cell?
(A) Cell wall
(B) Cell membrane
(C) Cytoplasm
(D) Nucleus

Ans :

(A) Cell wall
Plant cells, like those of an onion, possess a rigid outer layer called the cell wall, which provides structural support. Animal cells, including human cheek cells, lack this feature and are enclosed only by a flexible cell membrane.

15. In the diagram of human cheek cells, what is the jelly-like substance that fills the space between the nucleus and the cell membrane?



(A) Cell wall (B) Cytoplasm
(C) Vacuole (D) Chloroplast

Ans :

(B) Cytoplasm
Cytoplasm is the substance that fills the entire cell and surrounds the nucleus. It is where most of the cell's metabolic activities occur and contains various other small components necessary for life processes.

16. Which part of a cell regulates all the activities that occur within it, including growth?
(A) The cell membrane
(B) The cytoplasm
(C) The nucleus
(D) The vacuole

Ans :

(C) The nucleus
The nucleus acts as the control center of the cell. It contains the cell's genetic material and directs all its major functions, such as metabolism, growth, and reproduction, ensuring the proper functioning and survival of the cell.

17. Which sequence correctly shows the levels of organization in a multicellular organism from simplest to most complex?
(A) Tissue → Cell → Organ → Organism
(B) Organism → Organ System → Tissue → Cell
(C) Cell → Organ → Tissue → Organism
(D) Cell → Tissue → Organ → Organ System → Organism

Ans :

(D) Cell → Tissue → Organ → Organ System → Organism
The body of a complex organism is built in a hierarchical manner. Cells are the basic units, which group to form tissues. Tissues combine to create organs, which work together in organ systems. All systems together constitute the complete organism.

18. Organisms like bacteria and Amoeba, which are made of just one cell, are classified as what type of organisms?
(A) Unicellular
(B) Multicellular
(C) Acellular
(D) Non-cellular

Ans :

(A) Unicellular
The term "unicellular" directly translates to "one-celled." These organisms carry out all essential life functions, such as feeding, respiration, and reproduction, within the confines of a single, independent cell.

19. Why do peels of fruits and vegetables in a compost pit turn into a dark-coloured material called manure?
(A) The heat from the sun cooks the peels.
(B) Microorganisms like fungi and bacteria break down the waste.
(C) The water in the soil dissolves the peels.
(D) The peels react chemically with the soil minerals.

Ans :

(B) Microorganisms like fungi and bacteria break down the waste.
Decomposition is an active biological process. Microorganisms present in the soil, such as certain fungi and bacteria, act on organic waste like fruit and vegetable peels, breaking them down into simpler, nutrient-rich substances that form manure.

Downloaded from www.pdf.tube

20. A student adds yeast, sugar, and warm water to flour. After a few hours, the dough rises. What gas produced by the yeast is responsible for this?
(A) Oxygen
(B) Nitrogen
(C) Carbon dioxide
(D) Hydrogen

Ans :

(C) Carbon dioxide
Yeast is a fungus that performs respiration by breaking down sugar for energy. A by product of this process is carbon dioxide gas. The gas forms tiny bubbles that get trapped in the dough, causing it to expand and rise.

21. The bacterium Lactobacillus is primarily responsible for which process?
(A) Making bread fluffy.
(B) Fixing nitrogen in the soil.
(C) Causing fruits to rot.
(D) Fermenting milk to form curd.

Ans :

(D) Fermenting milk to form curd.
Lactobacillus is a bacterium commonly found in curd. It consumes the sugar (lactose) in milk and, through fermentation, produces lactic acid. This acid causes the milk proteins to coagulate, turning the milk into curd.

22. What is the main function of Rhizobium bacteria found in the root nodules of legume plants?
(A) They trap nitrogen from the air and make it useful for the plant.
(B) They produce large amounts of oxygen for the plant.
(C) They protect the plant's roots from various diseases.
(D) They help the plant's root system absorb much more water.

Ans :

(A) They trap nitrogen from the air and make it useful for the plant.
Rhizobium bacteria have a symbiotic relationship with legume plants. They perform nitrogen fixation, a process where they convert atmospheric nitrogen gas into a form that the plant can absorb and use for its growth, enriching the soil naturally.

23. A brick is to a wall as a cell is to a(n) _____.
(A) Nucleus (B) Tissue
(C) Microbe (D) Organism

Ans :

(D) Organism
Just as a brick is the fundamental building block that is repeated to construct an entire wall, a cell is the basic structural and functional unit of life that makes up a complete living organism.

24. What are viruses described as?
(A) Unicellular organisms that possess a distinct nucleus.
(B) Microscopic, acellular entities that multiply inside living cells.
(C) Multicellular fungi that typically live in the soil.
(D) Plant-like organisms that can perform photosynthesis.

Ans :

(B) Microscopic, acellular entities that multiply inside living cells.
Viruses are unique because they are not made of cells (acellular). They are microscopic infectious agents that are inert outside of a host. They can only replicate and multiply by invading a living cell and using its machinery.

25. Which statement about the cell membrane is incorrect?
(A) It encloses the cytoplasm and nucleus.
(B) It separates one cell from another.
(C) It is a rigid, non-porous layer.
(D) It allows the entry and exit of materials.

Ans :

(C) It is a rigid, non-porous layer.
The cell membrane is a flexible, porous boundary. Its porosity is crucial as it selectively allows essential materials to enter the cell and waste products to exit, regulating the cell's internal environment. The cell wall is the rigid layer in plants.

26. A student observes a cell under a microscope that has a rectangular shape, a large central vacuole, and a distinct cell wall. What type of cell is it most likely?
(A) A plant cell
(B) A human cheek cell
(C) A muscle cell
(D) An Amoeba

Ans :

(A) A plant cell
These are characteristic features of a plant cell. The rigid cell wall gives it a fixed, often

NODIA

rectangular shape, and the large central vacuole is used for storage and maintaining turgor pressure, distinguishing it from an animal cell.

27. What is the role of chloroplasts in plant cells?
(A) To provide rigidity and strength.
(B) To contain chlorophyll and help in photosynthesis.
(C) To control all cell activities.
(D) To store waste materials.

Ans :

(B) To contain chlorophyll and help in photosynthesis.
Chloroplasts are specialized plastids found in plant cells. They contain the green pigment chlorophyll, which captures light energy from the sun to power the process of photosynthesis, enabling the plant to produce its own food.

28. How does a bacterial cell's genetic material differ from that of a plant or animal cell?
(A) Bacteria have no form of genetic material whatsoever.
(B) Bacteria have a well-defined nucleus with a surrounding membrane.
(C) Bacteria lack a defined nucleus; their genetic material is in the nucleoid.
(D) Bacteria's genetic material is stored within the thick cell wall.

Ans :

(C) Bacteria lack a defined nucleus; their genetic material is in the nucleoid.
A key difference between bacterial cells (prokaryotes) and plant/animal cells (eukaryotes) is the absence of a membrane-bound nucleus in bacteria. Their genetic material is concentrated in an area of the cytoplasm known as the nucleoid.

29. A muscle cell is shaped like a _____, while a nerve cell is very long and has _____.
(A) Sphere, a shell
(B) Rectangle, a wall
(C) Cube, roots
(D) Spindle, branches

Ans :

(D) Spindle, branches
The shape of a cell is related to its function. Muscle cells have an elongated, spindle shape that allows for contraction. Nerve cells are long and have branches (dendrites) to transmit signals over long distances within the body.

30. The largest known single cell in the living world is the yolk of what animal's egg?
(A) Ostrich
(B) Hen
(C) Eagle
(D) Crocodile

Ans :

(A) Ostrich
The yolk of an ostrich egg is a single, massive cell. It is the largest known cell, measuring up to 170 mm in diameter, and contains the nutrients necessary for the development of an embryo.

31. Why are pickles and murabbas preserved from microbial infection?
(A) They are kept in completely airtight glass or plastic jars.
(B) High salt or sugar content does not allow microbes to grow.
(C) The fruits and vegetables used are naturally resistant to microbes.
(D) The various spices added are poisonous to all living things.

Ans :

(B) High salt or sugar content does not allow microbes to grow.
High concentrations of salt or sugar act as preservatives. They create an environment where most microbes cannot survive or multiply due to water being drawn out of their cells through osmosis, thus preventing spoilage.

32. What causes the sour taste of curd?
(A) The production of alcohol by yeast.
(B) The presence of a high amount of sugar.
(C) The production of lactic acid by bacteria.
(D) The breakdown of fats in the milk.

Ans :

(C) The production of lactic acid by bacteria.
During the fermentation of milk into curd, bacteria like Lactobacillus convert the milk sugar (lactose) into lactic acid. This acid is what gives curd its characteristic tangy, sour taste and also helps preserve it.

33. Yeast, which is used to make bread, belongs to which group of microorganisms?
(A) Bacteria
(B) Protozoa
(C) Algae
(D) Fungi

Click Here to Buy book on Amazon

Ans :

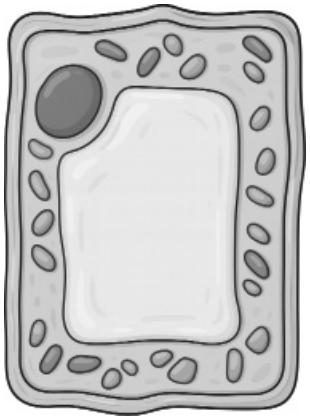
(D) Fungi
Yeast is a type of single-celled microorganism that is classified within the kingdom Fungi. While many fungi are multicellular (like moulds), yeast is a notable example of a unicellular fungus widely used in baking and brewing.

34. Why can microorganisms be found in extreme environments like hot springs and snow-cold zones?
(A) Because they show great diversity and have adapted to various conditions.
(B) Because they are not actually classified as living organisms.
(C) Because they can turn themselves invisible to avoid harsh conditions.
(D) Because all extreme environments contain plenty of available food.

Ans :

(A) Because they show great diversity and have adapted to various conditions.
Microorganisms are incredibly diverse and have evolved to thrive in a vast range of habitats. Some species possess special adaptations that allow them to survive and even flourish in extreme temperatures, pressures, or chemical conditions where other life forms cannot.

35. Looking at a diagram of a plant cell, the large, empty-looking space that helps store substances and maintain the cell's shape is the _____.



(A) Nucleus
(B) Chloroplast
(C) Vacuole
(D) Mitochondrion

Ans :

(C) Vacuole
Plant cells typically have a large central vacuole. This membrane-bound sac plays multiple roles, including storing water, nutrients, and waste products. It also helps maintain turgor pressure against the cell wall, which provides support to the plant.

36. A group of similar cells performing a specific function is called a(n) _____.
(A) Organ
(B) Tissue
(C) Organism
(D) Organ system

Ans :

(B) Tissue
In multicellular organisms, cells specialize and organize into functional units. A tissue is defined as a collection of similar cells that work together to carry out a particular function, such as muscle tissue for contraction or nerve tissue for signaling.

37. A student observes some tiny, green, moving organisms in a drop of pond water under a microscope. These organisms are most likely a type of _____.
(A) Fungus
(B) Protozoa
(C) Bacteria
(D) Algae

Ans :

(D) Algae
Microscopic algae are common in pond water. The green color indicates the presence of chlorophyll, a pigment used for photosynthesis, which is characteristic of algae and other plant-like organisms. Many micro-algae are also motile.

38. What is the purpose of using a coverslip when preparing a temporary mount for a microscope?
(A) To protect the specimen and lens, and to flatten the liquid.
(B) To color the entire specimen a single, uniform color.
(C) To hold the fragile glass slide firmly in its place.
(D) To magnify the specimen without using the objective lens.

Ans :

(A) To protect the specimen and lens, and to flatten the liquid.
A coverslip is a thin glass square placed over the specimen. It protects the objective lens from the

NODIA

liquid, prevents the specimen from drying out quickly, and flattens the specimen into a single plane for easier focusing.

39. The porous nature of the cell membrane is important because it _____.
(A) Gives the cell a rigid shape
(B) Allows for the controlled entry and exit of materials
(C) Allows the cell to produce its own food
(D) Stores the cell's genetic information

Ans :

(B) Allows for the controlled entry and exit of materials
The cell membrane is selectively permeable, meaning it has pores and channels that regulate what substances can pass through. This control is vital for the cell to take in nutrients, expel waste, and maintain a stable internal environment.

40. What is a key difference between yeast and mould, even though both are fungi?
(A) Yeast performs photosynthesis, while mould does not.
(B) Mould is a microbe, while yeast is not.
(C) Yeast is unicellular, while mould is multicellular.
(D) Yeast has a cell wall, while mould does not.

Ans :

(C) Yeast is unicellular, while mould is multicellular.
Both yeast and mould are types of fungi. However, yeast exists as individual, single cells. Moulds, on the other hand, grow as a network of multicellular filaments called hyphae, forming a visible, fuzzy mass.

41. In an experiment to make curd, why is the milk kept in a warm place?
(A) To kill all the bacteria in the milk.
(B) To make the milk evaporate faster.
(C) To prevent the milk from becoming sour.
(D) Because the bacteria that form curd grow well in warm conditions.

Ans :

(D) Because the bacteria that form curd grow well in warm conditions.
The fermentation process carried out by Lactobacillus bacteria is temperature-dependent. These bacteria are most active and multiply rapidly in warm conditions, which accelerates the conversion of milk into curd. Cold temperatures slow down or inhibit their growth.

42. Why are microorganisms considered key players in cleaning the environment?
(A) They decompose dead organic matter and recycle nutrients.
(B) They consume large amounts of plastic waste.
(C) They convert sunlight into clean energy.
(D) They filter pollutants directly from the air.

Ans :

(A) They decompose dead organic matter and recycle nutrients.
Decomposer microorganisms, like many bacteria and fungi, play a vital ecological role. They break down complex organic materials from dead plants and animals into simpler substances, returning essential nutrients to the soil and preventing the accumulation of waste.

43. The special bacterium developed by Dr. Ananda Mohan Chakrabarty was significant because it could _____.
(A) Produce antibiotics
(B) Break down oil spills
(C) Fix nitrogen in non-legume plants
(D) Survive in outer space

Ans :

(B) Break down oil spills
Dr. Chakrabarty's pioneering work in genetic engineering led to the development of a bacterium capable of consuming and breaking down crude oil. This discovery demonstrated the potential of using microorganisms for bioremediation to clean up environmental pollution.

44. Which of the following statements about microalgae is incorrect?
(A) They are microscopic organisms that resemble plants.
(B) They produce over half of the Earth's oxygen supply.
(C) They are a type of complex multicellular fungus.
(D) Some, like Spirulina, are used as health supplements.

Ans :

(C) They are a type of complex multicellular fungus.
Micro-algae are not fungi; they are a diverse group of photosynthetic organisms, often unicellular, that are classified as protists. They are plant-like

Downloaded from www.pdf.tube

because they contain chlorophyll and produce their own food using sunlight, a key difference from fungi.

45. Lactobacillus is to curd as Rhizobium is to _____.
(A) Bread
(B) Manure
(C) Antibiotics
(D) Root nodules

Ans :

(D) Root nodules
This analogy relates a specific bacterium to its primary location or product. Lactobacillus is the key bacterium in the formation of curd. Similarly, Rhizobium is the bacterium that resides in the root nodules of legume plants to perform nitrogen fixation.

46. The long, branched shape of a nerve cell is a direct adaptation for its function, which is to _____.
(A) Carry messages over very long distances in the body.
(B) Contract and relax in order to cause movement.
(C) Provide a strong and protective lining for organs.
(D) Store large amounts of water and other nutrients.

Ans :

(A) Carry messages over very long distances in the body.
The structure of a nerve cell (neuron) is highly specialized. Its long axon and branched dendrites allow it to form connections with other cells and transmit electrochemical signals rapidly across different parts of the body.

47. A student finds an irregularly shaped, single-celled organism moving in pond water. Based on the examples given, it is most likely a(n) _____.
(A) Algae
(B) Protozoa
(C) Fungus
(D) Virus

Ans :

(B) Protozoa
Protozoa, such as Amoeba and Paramecium, are single-celled microorganisms commonly found in aquatic environments. They are known for their ability to move and their often irregular or complex shapes, fitting the description.

48. The _____ separates the cell from its surroundings, while the _____ provides additional rigidity to a plant cell.
(A) Nucleus, cytoplasm
(B) Cytoplasm, vacuole
(C) Cell membrane, cell wall
(D) Cell wall, cell membrane

Ans :

(C) Cell membrane, cell wall
The cell membrane is the outer boundary of all cells, controlling what enters and leaves. In plant cells, an additional, more rigid layer called the cell wall exists outside the membrane, providing structural support and protection.

49. Upon observing an onion peel slide, a student notices that the cells are closely arranged without any space between them and have a regular, rectangular shape. This arrangement is primarily due to the _____.
(A) Presence of a nucleus
(B) Large size of the cells
(C) Fluidity of the cytoplasm
(D) Rigidity of the cell wall

Ans :

(D) Rigidity of the cell wall
The cell wall in plant cells is a firm, rigid structure. It gives the cell a fixed shape and causes the cells to fit together tightly and neatly, much like bricks in a wall, providing structural support to the entire plant tissue.

50. Why is the cell considered the basic unit of life?
(A) Because it is the smallest unit that can carry out all life processes.
(B) Because it is by far the largest part of any living organism.
(C) Because all cells in every organism look exactly the same.
(D) Because cells can only be seen with a powerful electron microscope.

Ans :

(A) Because it is the smallest unit that can carry out all life processes.
The cell is the fundamental unit because a single cell, as in unicellular organisms, can perform all the functions required for survival—metabolism, growth, response to stimuli, and reproduction.

NODIA

In multicellular organisms, they are the building blocks of the entire structure.

51. A farmer rotates crops by planting legumes like peas one season. What is the main scientific reason for this practice?
(A) Legumes use less water than other crops.
(B) The Rhizobium bacteria in legume roots naturally increase the nitrogen in the soil.
(C) Legume roots break up the soil, making it softer.
(D) Legumes are more resistant to pests.

Ans :

(B) The Rhizobium bacteria in legume roots naturally increase the nitrogen in the soil.
This agricultural practice leverages a natural biological process. The Rhizobium bacteria in the root nodules of legumes fix atmospheric nitrogen, enriching the soil with this essential nutrient for the benefit of the next crop planted in that field.

52. Which statement about organisms is correct?
(A) All organisms are multicellular.
(B) Only organisms visible to the naked eye are considered living.
(C) All living beings, whether plants or animals, are called organisms.
(D) All organisms are made of tissues and organs.

Ans :

(C) All living beings, whether plants or animals, are called organisms.
The term "organism" is a general term for any individual living being. This includes a vast range of life forms, from single-celled microbes to complex multicellular plants and animals.

Download INDIA's Best Study app NODIA

53. All of the following are main parts of a typical animal cell EXCEPT the _____.
(A) Cell membrane
(B) Nucleus
(C) Cytoplasm
(D) Cell wall

Ans :

(D) Cell wall
The three basic components of an animal cell are the cell membrane, the cytoplasm, and the nucleus. The cell wall is a structural feature found in plant cells, fungi, and bacteria, but not in animal cells.

54. Which is the correct order of steps for preparing a temporary mount of human cheek cells?
(A) Scrape → Place on slide → Add stain → Add glycerin → Add coverslip
(B) Scrape → Stain → Place on slide → Add glycerin → Add coverslip
(C) Stain → Scrape → Place on slide → Add coverslip → Add glycerin
(D) Place on slide → Scrape → Add glycerin → Add stain → Add coverslip

Ans :

(A) Scrape → Place on slide → Add stain → Add glycerin → Add coverslip
The correct procedure involves first obtaining the specimen (scraping the cheek) and placing it on the slide in a drop of water. Then, a stain is added for visibility, followed by glycerin to prevent drying, and finally, the coverslip is placed on top.

55. What are organisms like fungi and bacteria that break down plant and animal waste into simpler substances called?
(A) Producers
(B) Decomposers
(C) Consumers
(D) Parasites

Ans :

(B) Decomposers
Decomposers are organisms that play a critical role in nutrient cycling. They obtain energy by breaking down dead organic material, such as fallen leaves and dead animals, returning essential nutrients to the ecosystem for producers to use.

56. The invention of the microscope was a crucial turning point in biology because it _____.
(A) allowed scientists to finally create new forms of life.
(B) proved that all known diseases were caused by germs.
(C) opened up a hidden world of tiny, previously unknown creatures.
(D) made it possible for humans to see the planets and stars.

Ans :

(C) opened up a hidden world of tiny, previously unknown creatures.
Before the microscope, human understanding of the living world was limited to what could be seen by the naked eye. Its invention revealed the existence of a vast and complex microscopic world, fundamentally changing biology and medicine.

Click Here to Buy book on Amazon

57. Why is glycerin added to a specimen on a microscope slide before placing the coverslip?
(A) To stain the cells a blue color.
(B) To glue the coverslip firmly to the slide.
(C) To dissolve the cell membrane so the nucleus is visible.
(D) To prevent the cells from drying out and improve clarity.

Ans :

(D) To prevent the cells from drying out and improve clarity.
Glycerin is a viscous liquid that serves two main purposes in slide preparation. It prevents the water-based specimen from evaporating too quickly under the heat of the microscope lamp and improves the optical clarity for better visualization.

58. A primary difference between Amoeba and a human is that _____.
(A) Amoeba is unicellular, while a human is multicellular
(B) A human is an organism, but Amoeba is not
(C) Amoeba has a cell wall, while human cells do not
(D) A human can move, but Amoeba cannot

Ans :

(A) Amoeba is unicellular, while a human is multicellular
This highlights the difference in complexity. An Amoeba is a complete organism consisting of just one cell. A human is a highly complex organism made up of trillions of specialized cells organized into tissues, organs, and systems.

59. In Robert Hooke's book Micrographia, he published detailed drawings of what he saw through his microscope. What specific material did he examine when he first described "cells"?
(A) A drop of pond water
(B) A thin slice of cork
(C) A sample of human blood
(D) The wing of an insect

Ans :

(B) A thin slice of cork
One of Robert Hooke's most famous observations, detailed in Micrographia, was of a thin slice of cork. He noted it was composed of many small, box-like structures which he named cells, laying the groundwork for cell theory.

60. Which of the following statements about the nucleus is incorrect?
(A) It is generally a round structure in the middle of the cell.
(B) It is enclosed by the cytoplasm.
(C) It is an empty space used for storage.
(D) It is covered by a thin membrane.

Ans :

(C) It is an empty space used for storage.
The nucleus is not an empty space; it is filled with genetic material and is the cell's control center. The large, empty-looking space used for storage, especially in plant cells, is the vacuole.

61. The fact that all life, from a single-celled bacterium to a giant whale, starts from a single cell (like an egg or through division) supports the idea that the cell is the _____.
(A) Most complex and largest part of any known organism.
(B) Only part of an organism that truly matters for survival.
(C) Rarest and most difficult to find component in nature.
(D) Basic structural and functional unit of all known life.

Ans :

(D) Basic structural and functional unit of all known life.
The universal presence of cells as the foundation of all organisms, and the fact that all complex life arises from a single cell, is the central evidence for the Cell Theory, which states that the cell is the fundamental unit of structure and function in all living things.

62. Spirulina and Chlorella are examples of what type of microorganism, known for being a nutrient-rich health supplement?
(A) Microalgae
(B) Bacteria
(C) Viruses
(D) Fungi

Ans :

(A) Microalgae
Spirulina and Chlorella are types of microscopic algae. They are cultivated commercially because they are rich in proteins, vitamins, and minerals, making them popular as superfoods and dietary supplements.

NODIA

63. What is the primary function of the cell wall in a plant cell?
(A) To regulate the entry and exit of materials.
(B) To provide rigidity and strength.
(C) To perform photosynthesis.
(D) To store genetic information.

Ans :

(B) To provide rigidity and strength.
The cell wall is a tough, rigid layer made primarily of cellulose that surrounds the plant cell membrane. Its main role is to provide structural support, protection, and maintain the cell's shape, preventing it from bursting.

64. The cotton-like growth often seen on rotting oranges or stale bread is caused by _____.
(A) A collection of dust particles
(B) The fruit drying out and crystallizing
(C) The growth of microorganisms like moulds (fungi)
(D) A chemical reaction with oxygen in the air

Ans :

(C) the growth of microorganisms like moulds (fungi)
The visible fuzzy or cottony patches on spoiled food are typically colonies of mould, which is a type of multicellular fungus. These microorganisms thrive on the organic material, decomposing it and causing spoilage.

65. To see the details of an ant's body more clearly, which simple optical tool would be most effective?
(A) A telescope
(B) A prism
(C) A mirror
(D) A magnifying glass

Ans :

(D) A magnifying glass
A magnifying glass is a convex lens used to produce a magnified image of an object. It is the appropriate tool for observing small but visible objects like insects in greater detail, as opposed to a telescope for distant objects.

66. A gardener collects dry leaves and plant waste in a pit to create natural manure. This process relies on the action of which organisms?
(A) Decomposer bacteria and fungi in the soil.
(B) Earthworms and insects only.
(C) Viruses that infect plants.
(D) Algae that grow in the presence of sunlight.

Ans :

(A) Decomposer bacteria and fungi in the soil.
Composting is a biological process driven by a community of microorganisms. Bacteria and fungi are the primary decomposers that break down the complex organic matter in leaves and plant waste into simple, nutrient-rich humus or manure.

67. Unicellular is to Amoeba as multicellular is to _____.
(A) Bacterium (B) Plant
(C) Virus (D) Yeast

Ans :

(B) Plant
This analogy contrasts the number of cells in different organisms. Amoeba is a classic example of a unicellular organism. A plant is a complex organism composed of many different types of cells, making it multicellular.

68. Which of the following is a correct statement about vacuoles?
(A) They are large in animal cells and small or absent in plant cells.
(B) They contain the cell's genetic material.
(C) They are large in plant cells and help maintain the cell's shape.
(D) They are the site of photosynthesis.

Ans :

(C) They are large in plant cells and help maintain the cell's shape.
A defining feature of mature plant cells is a large central vacuole, which can occupy a significant portion of the cell volume. It stores materials and maintains turgor pressure, which is crucial for the structural integrity of the cell.

69. The life of complex living organisms, called _____ organisms, begins with a single cell like a(n) _____.
(A) Unicellular, bacterium
(B) Acellular, virus
(C) Simple, spore
(D) Multicellular, egg

Ans :

(D) Multicellular, egg
Multicellular organisms are those made up of many cells. Even these complex life forms, including animals, typically begin their life cycle as a single fertilized cell, known as an egg or zygote, which then divides repeatedly.

NODIA

70. The ability of a cell membrane to allow some substances to pass through while blocking others is known as being _____.
(A) Porous or selectively permeable
(B) Rigid
(C) Opaque
(D) Inactive

Ans :

(A) Porous or selectively permeable
The cell membrane is not a solid barrier. It is porous and selectively permeable, which means it has a sophisticated system of channels and carriers that control the passage of specific ions and molecules, maintaining the cell's internal balance.

71. While both are microorganisms, a key difference between bacteria and algae is that algae _____.
(A) Are always multicellular
(B) Can perform photosynthesis
(C) Lack a cell membrane
(D) Are a type of virus

Ans :

(B) Can perform photosynthesis
Most algae contain chlorophyll and are photosynthetic, meaning they can produce their own food using light energy, similar to plants. Most bacteria are not photosynthetic and must obtain energy from other sources.

72. What is the direct effect of the cell wall on the overall structure of a plant?
(A) It makes the plant flexible and able to bend easily.
(B) It provides the green color to the leaves.
(C) It gives the plant rigidity and strength for support.
(D) It transports water from the roots to the leaves.

Ans :

(C) It gives the plant rigidity and strength for support.
The collective strength of the rigid cell walls of millions of plant cells provides the structural support for the entire plant. This allows plants to grow upright and maintain their form against gravity and environmental stresses.

73. Which organelle contains other components of the cell like carbohydrates and proteins, and is the site for most life processes?
(A) Vacuole
(B) Nucleus
(C) Cell wall
(D) Cytoplasm

Ans :

(D) Cytoplasm
Cytoplasm is the entire content within a cell, excluding the nucleus. This jelly-like substance is where a vast number of metabolic reactions take place, and it holds all the other organelles in place.

74. According to ancient Indian texts like the Vedas, what was the word 'Krimi' used to refer to?
(A) Both visible and invisible tiny entities.
(B) Only large, visible insects.
(C) A type of plant medicine.
(D) The planets and stars.

Ans :

(A) Both visible and invisible tiny entities.
The term 'Krimi' in ancient Vedic texts was a broad term. It encompassed different tiny entities, including those that were visible ('Drishya') as well as those that were invisible ('Adrishya'), showing an early awareness of a world beyond normal sight.

75. Which statement about the diversity of microorganisms is incorrect?
(A) They can be found in water, soil, and air.
(B) They are all identical in shape and size.
(C) They can live inside the bodies of other organisms.
(D) Some can survive in extreme temperatures.

Ans :

(B) They are all identical in shape and size.
Microorganisms exhibit immense diversity. As seen in observations of pond and soil water, they come in various shapes (spherical, rod, irregular) and sizes, and belong to different groups like bacteria, fungi, algae, and protozoa.

76. Why must a student be careful not to trap air bubbles when placing a coverslip on a slide?
(A) Air bubbles can damage the microscope lens.
(B) Air bubbles can kill the cells being observed.
(C) Air bubbles can obscure the view of the specimen.
(D) Air bubbles can cause the stain to fade.

Ans :

(C) Air bubbles can obscure the view of the specimen.

Downloaded from www.pdf.tube

CBSE CLASS 12

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English Core	Mathematics	Physics	Chemistry
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Biology	Physical Education	Informatics Practice	Computer Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Accountancy	Business Studies	Economics	Entrepreneurship
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Legal Studies	Applied Maths	Hindi	History
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Geography	Political Science	Psychology	Sociology
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF(NEET, JEE and CUET) visit www.pdf.tube

CBSE CLASS 11

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English Core	Mathematics	Physics	Chemistry
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Biology	Physical Education	Informatic Practice	Computer Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Accountancy	Business Studies	Economics	Entrepreneurship
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Legal Studies	Applied Maths	Hindi	History
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Geography	Political Science	Psychology	Sociology
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF (NEET, JEE and CUET) visit www.pdf.tube

CBSE CLASS 10

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English LL	English Comm	Mathematics STD	Mathematics Basic
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Science	Social Science	IT (402)	AI (417)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Data Science (419)	हिंदी अ	हिंदी ब	संस्कृत
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

विज्ञान	सामाजिक विज्ञान	गणित मानक	गणित आधार
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For Olympiad Books Visit

www.lympiad.com

For other books PDF visit www.pdf.tube

CBSE CLASS 9

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English LL	English Comm	Mathematics STD	Mathematics Basic
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

Science	Social Science	IT (402)	AI (417)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

Data Science (419)	हिंदी अ	हिंदी ब	संस्कृत
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

विज्ञान	सामाजिक विज्ञान	गणित मानक	गणित आधार
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF	DOWNLOAD FREE PDF WWW.MCQGPT.COM PDF

For Olympiad Books Visit

www.lympiad.com

For other books PDF visit www.pdf.tube

CBSE CLASS 8

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English	Mathematics	Science	Social Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

हिंदी	संस्कृत	IT (906)	AI (901)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Data Science (911)	Coding (910)	विज्ञान	सामाजिक विज्ञान
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित	NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Science	Olympiad Maths	Olympiad General Aptitude	
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	For Olympiad Books Visit www.lympiad.com
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	

For other books PDF visit www.pdf.tube

CBSE CLASS 7

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English	Mathematics	Science	Social Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

हिंदी	संस्कृत	IT (906)	AI (901)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Data Science (911)	Coding (910)	विज्ञान	सामाजिक विज्ञान
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित	NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Science	Olympiad Maths	Olympiad General Aptitude	
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	For Olympiad Books Visit www.lympiad.com
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	

For other books PDF visit www.pdf.tube

CBSE CLASS 6

Previous Year Solved Question Bank

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English	Mathematics	Science	Social Science
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

हिंदी	संस्कृत	IT (906)	AI (901)
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Data Science (911)	Coding (910)	विज्ञान	सामाजिक विज्ञान
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित	NEET Foundation Science	JEE Foundation Science	JEE Foundation Maths
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Science	Olympiad Maths	Olympiad General Aptitude	
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	For Olympiad Books Visit www.lympiad.com
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	

For other books PDF visit www.pdf.tube

CBSE CLASS 5 and 4
Worksheets

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English 5th	Mathematics 5th	EVS 5th	हिंदी 5th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 5th	EVS हिन्दी 5th	Olympiad Maths 5th	Olympiad Science 5th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Aptitude 5th	Olympiad Aptitude 4th
BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For Olympiad Books Visit
www.lympiad.com

English 4th	Mathematics 4th	EVS 4th	हिंदी 4th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 4th	EVS हिन्दी 4th	Olympiad Maths 4th	Olympiad Science 4th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF visit www.pdf.tube

CBSE CLASS 3 and 2
Worksheets

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English 3th	Mathematics 3th	EVS 3th	हिंदी 3th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 3th	EVS हिन्दी 3th	Olympiad Maths 3th	Olympiad Science 3th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Aptitude 3th	Olympiad Aptitude 2th
BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For Olympiad Books Visit
www.lympiad.com

English 2th	Mathematics 2th	EVS 2th	हिंदी 2th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 2th	EVS हिन्दी 2th	Olympiad Maths 2th	Olympiad Science 2th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF visit www.pdf.tube

CBSE CLASS 1 and KG
Worksheets

Click your Subject and Instantly get a free PDF or Order the Hard copy from Amazon.

English 1th	Mathematics 1th	EVS 1th	हिंदी 1th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित 1th	EVS हिन्दी 1th	Olympiad Maths 1th	Olympiad Science 1th
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

Olympiad Aptitude 1th	Olympiad Aptitude KG
BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For Olympiad Books Visit
www.lympiad.com

English KG	Mathematics KG	EVS KG	हिंदी KG
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

गणित KG	EVS हिन्दी KG	Olympiad Maths KG	Olympiad Science KG
BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon	BUY IT ON amazon
DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM	DOWNLOAD FREE PDF WWW.MCQGPT.COM

For other books PDF visit www.pdf.tube

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

Air bubbles appear as distinct, dark-ringed circles under the microscope and can block or distort the view of the actual specimen. Placing the coverslip at an angle is a technique used to prevent these bubbles from getting trapped.

77. The fact that farmers grow legumes in rotation with other crops demonstrates a practical application of understanding _____.
(A) The process of photosynthesis
(B) The structure of the plant cell wall
(C) The life cycle of viruses
(D) The role of beneficial microorganisms in soil fertility

Ans :

(D) The role of beneficial microorganisms in soil fertility
Crop rotation with legumes is a farming technique based on the scientific knowledge of nitrogen fixation. Farmers use the symbiotic relationship between legumes and Rhizobium bacteria to naturally enrich the soil with nitrogen, a vital nutrient for plant growth.

78. A cell, tissue, organ, and organ system are all components of what level of organization?
(A) A multicellular organism
(B) A unicellular organism
(C) A microbial colony
(D) An ecosystem

Ans :

(A) A multicellular organism
These are the hierarchical levels of structural organization found within a single, complex multicellular organism. Each level builds upon the previous one, from the basic cell to the fully functional organism.

79. Which scientific instrument is required to see subcellular components with very high magnification, up to 1,000,000 times?
(A) A folds cope
(B) An electron microscope
(C) A simple magnifying glass
(D) A standard laboratory light microscope

Ans :

(B) An electron microscope
While light microscopes are excellent for viewing cells, they have limitations. To observe the fine details of subcellular structures and organelles, the much higher magnification and resolution of an electron microscope are necessary.

MATCHING TYPE QUESTIONS

80. Match the pioneering scientists with their key discoveries in the world of microbiology.

	Column A		Column B
1	Robert Hooke	A	The first person to clearly see and describe tiny living things like bacteria.
2	Antonie van Leeuwenhoek	B	An instrument with lenses that makes tiny, invisible objects appear larger.
3	Microscope	C	The basic structural and functional unit of all living organisms.
4	Cell	D	Published Micrographia and was the first to use the term "cell."

Options
(a) 1-D, 2-A, 3-B, 4-C
(b) 1-C, 2-B, 3-D, 4-A
(c) 1-A, 2-D, 3-C, 4-B
(d) 1-B, 2-C, 3-A, 4-D

Ans :

(a) 1-D, 2-A, 3-B, 4-C
Robert Hooke published Micrographia and named the cell. Antonie van Leeuwenhoek was the first to describe living microbes. A microscope uses lenses to magnify objects. The cell is the basic unit of life.

NODIA

81. Match the cell part with its correct description or primary function.

	Column A		Column B
1	Cell Wall	A	The jelly-like substance that fills the cell and contains other components.
2	Chloroplast	B	A rigid outer layer found in plant and fungal cells that provides strength.
3	Cytoplasm	C	A green structure in plant cells that helps them make their own food.

4	Nucleoid	D	The region in a bacterial cell that holds genetic material, as it lacks a true nucleus.

Options
(a) 1-C, 2-A, 3-D, 4-B
(b) 1-D, 2-C, 3-B, 4-A
(c) 1-B, 2-C, 3-A, 4-D
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(c) 1-B, 2-C, 3-A, 4-D
The cell wall provides rigidity and strength to plant cells. Chloroplasts are green organelles for photosynthesis. Cytoplasm is the substance filling the cell. Bacteria have a nucleoid instead of a well-defined nucleus.

82. Match the beneficial microorganism with its primary role in nature or food production.

	Column A		**Column B**
1	Yeast	A	Bacteria that convert atmospheric nitrogen into a form usable by plants.
2	Lactobacillus	B	A type of fungus used in baking that makes dough rise.
3	Rhizobium	C	Microscopic plant-like organisms that produce a large portion of Earth's oxygen.
4	Microalgae	D	A bacterium that ferments the sugar in milk to produce curd.

Options
(a) 1-A, 2-C, 3-B, 4-D
(b) 1-B, 2-D, 3-A, 4-C
(c) 1-D, 2-A, 3-C, 4-B
(d) 1-C, 2-B, 3-D, 4-A

Ans :

(b) 1-B, 2-D, 3-A, 4-C
Yeast makes bread rise by producing carbon dioxide gas. Lactobacillus is the bacterium used to make curd from milk. Rhizobium performs nitrogen fixation in legume roots. Microalgae produce over half of the Earth's oxygen.

Download INDIA's Best Study app NODIA

83. Match the level of biological organization with its correct definition.

	Column A		**Column B**
1	Tissue	A	Several organs working together to perform a major function, like digestion.
2	Organ	B	The basic unit of life, like a single muscle cell.
3	Organ System	C	A group of similar cells working together, such as muscle tissue.
4	Cell	D	A structure made of different tissues organized to perform a task, like the stomach

Options
(a) 1-D, 2-B, 3-C, 4-A
(b) 1-A, 2-C, 3-B, 4-D
(c) 1-C, 2-D, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(c) 1-C, 2-D, 3-A, 4-B
A tissue is a group of similar cells performing a function. An organ consists of different tissues working together. An organ system is a group of organs. The cell is the basic unit of life.

84. Match the microbial process or entity with its defining characteristic.

	Column A		**Column B**
1	Decomposition	A	The process used by yeast and some bacteria to break down food, which is useful in making bread and curd.
2	Virus	B	The process where microbes break down dead plants and animals into simple, nutrient-rich manure.
3	Fermentation	C	The conversion of atmospheric nitrogen into a form usable by plants, performed by bacteria like Rhizobium.

Click Here to Buy book on Amazon

4	Nitrogen Fixation	D	A microscopic, acellular entity that can reproduce only by infecting a living host cell.

Options

(a) 1-A, 2-C, 3-D, 4-B

(b) 1-D, 2-A, 3-B, 4-C

(c) 1-C, 2-B, 3-D, 4-A

(d) 1-B, 2-D, 3-A, 4-C

Ans :

(d) 1-B, 2-D, 3-A, 4-C

Decomposition is the process of breaking down waste into manure. A virus is an acellular microbe that requires a host to multiply. Fermentation is used in making foods like bread and curd. Nitrogen fixation enriches soil with nitrogen.

TRUE AND FALSE

85. Robert Hooke is known as the "Father of Microbiology" because he was the first person to describe bacteria.

Ans :

False

Antonie van Leeuwenhoek is known as the Father of Microbiology. He was the first to clearly see and describe tiny living things like bacteria and blood cells.

86. The cell wall is a protective outer layer found in both animal and plant cells.

Ans :

False

The cell wall is an extra outer layer found in plant cells that provides rigidity and strength. Animal cells do not have a cell wall.

87. The nucleus of a cell is responsible for regulating all the activities that occur within it.

Ans :

True

The text states that the nucleus regulates all activities that happen inside the cell, including its growth.

88. The levels of biological organization in a complex organism proceed in the order : Tissue → Cell → Organ → Organism.

Ans :

False

The correct order of organization provided in the text is Cell → Tissue → Organ → Organ system → Organism.

89. Viruses are unicellular microorganisms that can reproduce independently in any environment.

Ans :

False

Viruses are described as being microscopic and acellular (not made of cells). They can only multiply when they enter a living host cell.

90. Yeast, a type of fungus, causes dough to rise by releasing large amounts of oxygen during respiration.

Ans :

False

During respiration, yeast releases carbon dioxide gas. The bubbles from this gas are what make the dough soft and fluffy.

91. The bacterium Lactobacillus plays a key role in the fermentation of milk to create curd.

Ans :

True

The text explains that curd contains several bacteria, including Lactobacillus, which feeds on the sugar in milk and ferments it to form curd.

NODIA

92. Rhizobium bacteria improve soil fertility by living in the roots of legume plants and trapping atmospheric nitrogen.

Ans :

True

These bacteria live in the root nodules of legumes like peas and beans, where they trap nitrogen from the air and make it useful for the plants.

93. Microalgae are harmful to the environment because they consume more than half of the Earth's oxygen supply.

Ans :

False

Microalgae are beneficial because they produce more than half of the Earth's oxygen supply through photosynthesis.

94. The yolk of an ostrich egg is recognized as the largest known single cell in the living world.

Ans :

True
The chapter explicitly states that the yolk of an ostrich egg is a single cell and is the largest known cell in the living world.

95. Bacterial cells are unique because, like plant and animal cells, they have a well-defined nucleus.

Ans :

False
Bacteria do not have a well-defined nucleus. Instead, their genetic material is located in a region called a nucleoid, which distinguishes them from plant and animal cells.

96. Adding a high concentration of salt or sugar to food acts as a preservative by preventing microbial growth.

Ans :

True
The chapter explains that foods like pickles do not spoil because high concentrations of salt or sugar do not allow microorganisms to grow on them.

97. All types of fungi, including yeast and bread mould, are unicellular organisms.

Ans :

False
The text clarifies that fungi show diversity; for example, yeast is a unicellular fungus, while mould is a multicellular fungus.

98. The specific shape and structure of a cell are directly related to the function it performs.

Ans :

True
The text states that the unique shape, size, and structure of cells help them carry out their specific functions.

99. Glycerin is added to a microscope slide to stain the cells and make them more visible.

Ans :

False
Glycerin is used to prevent the cells on a slide from drying out and to improve clarity for better visualization. Stains like safranin or methylene blue are used to add color and improve contrast.

VERY SHORT QUESTIONS

100. What scientific invention was crucial for discovering the hidden world of tiny living creatures that are invisible to the naked eye?

Ans :

The invention of the microscope was crucial. It opened up a fascinating hidden world filled with tiny living creatures previously unknown to humans.

101. What term is used to describe all living beings, including both the vast variety of plants and animals found around us?

Ans :

All living beings, whether they are plants or animals of different shapes, sizes, and colours, are collectively referred to as organisms.

102. Who was the first scientist to use the term 'cell' in a scientific context, and what was he observing?

Ans :

In 1665, Robert Hooke first used the word 'cell'. He observed small, empty honeycomb-like spaces in a thin slice of cork.

103. Why is Antonie van Leeuwenhoek known as the "Father of Microbiology"?

Ans :

He is known as the Father of Microbiology because he was the first person to build useful microscopes and clearly see bacteria.

104. What is the purpose of adding a stain like safranin to an onion peel sample before observing it under a microscope?

Ans :

Adding a stain like safranin gives a pinkish colour to the cells. This helps in making the cell structures clearly visible.

105. Why is a drop of glycerin added to a slide preparation of onion peel or cheek cells before placing the coverslip?

Downloaded from www.pdf.tube

Ans :

Glycerin is added to the slide to prevent the cells from drying out and to improve the clarity for better visualization.

106. What are the three main parts that are considered the basic components of a typical cell, as seen in cheek cells?

Ans :

The three basic parts of a cell are the cell membrane, which is the outer lining, the cytoplasm, and the centrally located nucleus.

107. What is the primary function of the cell membrane in a cell, besides enclosing the cytoplasm and nucleus?

Ans :

The cell membrane separates one cell from another and is porous, allowing essential materials to enter and waste materials to exit.

108. What additional outer layer is present in plant cells, like those of an onion peel, that is absent in animal cells?

Ans :

Plant cells, such as those found in an onion peel, possess an extra outer layer known as the cell wall for support.

109. Which part of the cell regulates all the activities that occur within it, including processes related to the cell's growth?

Ans :

The nucleus is the control centre of the cell. It regulates all cellular activities, including important functions like cell growth and maintenance.

110. How does the shape of a muscle cell relate to its function in the body, such as in the food pipe?

Ans :

The thin, flexible, and spindle-shape of muscle cells allows them to contract and relax, which helps in pushing food down the food pipe.

111. What are nerve cells also known as, and what is their primary function within the body?

Ans :

Nerve cells are also known as neurons. Their main function is to carry messages throughout the body to facilitate quick communication.

112. What is the definition of a tissue in the levels of biological organization?

Ans :

In the levels of organization, a tissue is defined as a group of similar cells that work together to perform a specific function.

113. Describe the level of organization known as an organ system in a living organism.

Ans :

An organ system consists of several different organs that work together in a coordinated manner to perform a major function in the body.

114. What are organisms called that are made up of many cells, and what are two examples of such organisms?

Ans :

Living beings made up of many cells are called multicellular organisms. Humans, other animals, and plants are all examples of them.

115. What is the yolk of an ostrich egg considered to be in the biological world?

Ans :

The yolk of an ostrich egg, which is the yellow part, is considered to be a single cell, the largest known cell.

NODIA

116. What are microorganisms, and why do they require a microscope to be seen?

Ans :

Microorganisms, or microbes, are living organisms that are so small they cannot be seen with the naked eye and require magnification.

117. What are organisms like bacteria and Amoeba called based on their cellular structure?

Ans :

Organisms such as bacteria and Amoeba are called unicellular organisms because they are made up of just a single cell.

118. How are viruses different from other microorganisms like bacteria in terms of their structure and reproduction?

Ans :

Viruses are different because they are microscopic and acellular, meaning they are not cells. They can only multiply inside a living cell.

119. What role do high concentrations of salt or sugar play in preserving food items like pickles?

Ans :

High concentrations of salt or sugar act as preservatives. They do not allow microorganisms to grow on food items like pickles.

120. How do microorganisms like fungi and bacteria contribute to cleaning the environment?

Ans :

These microorganisms act on plant and animal waste, breaking it down into simpler, nutrient-rich manure, thus recycling waste and cleaning the environment.

121. What is the term used in ancient Vedic texts that refers to different tiny entities, both visible and invisible?

Ans :

Ancient Indian texts, particularly the Vedas, use the word 'Krimi' to refer to various tiny entities, including both 'Drishya' and 'Adrishya'.

122. What special ability did the bacterium developed by Dr. Ananda Mohan Chakrabarty possess?

Ans :

The special bacterium developed by Dr. Ananda Mohan Chakrabarty had the unique ability to break down oil spills, helping to clean the environment.

123. What gas is released by yeast during respiration that makes dough soft and fluffy?

Ans :

During respiration, yeast releases carbon dioxide gas. The bubbles of this gas get trapped in the dough, making it soft and fluffy.

124. Which specific bacterium is mentioned as being responsible for the fermentation of milk to form curd?

Ans :

The text identifies the bacterium Lactobacillus as one of the key microbes responsible for fermenting the milk sugar, lactose, to form curd.

125. What substance produced by Lactobacillus bacteria gives curd its characteristic sour taste?

Ans :

Lactobacillus bacteria produce lactic acid during the fermentation of milk. This lactic acid is what gives curd its distinctly sour taste.

126. What is the function of Rhizobium bacteria found in the root nodules of legume plants?

Ans :

Rhizobium bacteria, living in root nodules of legumes, trap nitrogen from the air and convert it into a usable form for plants.

127. What significant contribution do microalgae make to the Earth's atmosphere?

Ans :

Microalgae are vital as they produce more than half of the Earth's oxygen supply through the process of photosynthesis using sunlight.

128. Why is the microalga Spirulina often referred to as a "superfood"?

Ans :

Spirulina is called a superfood because of its many health benefits, including being a rich source of protein and essential vitamin B12.

129. How do unicellular organisms, such as bacteria and protozoa, carry out all their essential life functions?

Ans :

Unicellular organisms are made of a single cell. They carry out all functions necessary for their survival within that single cell.

130. How did Robert Hooke's microscope compare in power to the unaided eye?

Ans :

Robert Hooke's microscope was a significant advancement, as it could make objects look 200 to 300 times bigger than the unaided eye.

131. Why do cheek cells, which form the inner lining of the mouth, have a thin and flat shape?

Ans :

Their thin and flat shape is related to their function. They fit together tightly to form a protective lining on the inner cheek surface.

132. What is the main difference between a unicellular fungus like yeast and a multicellular fungus like mould?

Click Here to Buy book on Amazon

Ans :

The main difference is their cellular structure. Yeast exists as a single-celled organism, while mould is composed of many interconnected cells.

133. What key structural feature is absent in bacterial cells that is present in plant and animal cells?

Ans :

Bacterial cells are distinct because they lack a well-defined nucleus and a nuclear membrane, which are present in other complex cells.

Download INDIA's Best Study app NODIA

134. Besides decomposition, what other environmental benefit is provided by bacteria that can live in oxygen-free environments?

Ans :

Some of these bacteria decompose waste and release a mixture of gases, including methane, which can be used as a fuel source (biogas).

135. How does the arrangement of onion peel cells contribute to the overall structure of the plant part?

Ans :

Onion cells are arranged closely and compactly without any space between them, which provides firmness and strength to the overall plant structure.

136. Why are farmers encouraged to grow legumes in rotation with other crops?

Ans :

This practice naturally increases the nitrogen content in the soil thanks to Rhizobium bacteria, keeping the soil healthy for the next crop.

137. What two threats are currently impacting the diversity and abundance of microalgae?

Ans :

The diversity and abundance of microalgae are being threatened by environmental factors such as pollution, climate change, and overall habitat destruction.

138. Why is it necessary to use a powerful electron microscope to see subcellular components?

Ans :

Observing subcellular components requires extremely high magnification, which an electron microscope provides by magnifying the cell about 1,000,000 times.

139. Compare the vacuoles found in plant cells to those typically found in animal cells.

Ans :

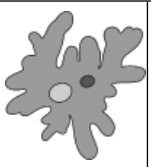
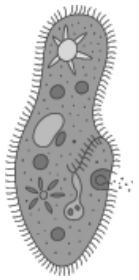
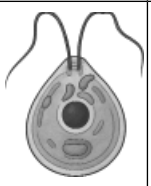
Plant cells have a large, single vacuole for storage and support, whereas animal cells usually lack vacuoles or have very small ones.

SHORT ANSWER QUESTIONS

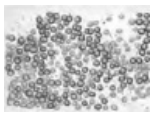
140. Based on the observations in Tables A and B, which category of microorganisms can prepare its own food, and why? Name one such organism found in soil.

Table A

Table 2.1 : Organisms present in pond water

S.N.	Diagram		Remarks
1.	Amoeba (Protozoa)		Single cell, moving, irregular shape
2.	Paramecium (Protozoa)		Single cell, moves from one place to another, movement takes place with the help of specialised structures
3.	Algae		Single cell, looks green because of the presence of green pigment, movement takes place with the help of specialised structures

Downloaded from www.pdf.tube

Table B		
Table 2.2 : Organisms present in soil suspension		
S. No.	**Diagram**	**Remarks**
1.	Bread mould (Fungi)	Branched filament without chlorophyll having sac-like structure
2.	Mould (Fungi)	Branched filament without chlorophyll having brush-like structure
3.	Algae 	Spherical, presence of chlorophyll a green pigment
4.	Bacteria	Spherical, comma, spiral or rod-shaped, one long hair-like structure and many small hair-like projections around the cell

Ans :

Algae can prepare their own food because the remarks in the tables note the presence of green pigment, which is chlorophyll for photosynthesis. Fungi and protozoa lack this pigment. An example from the soil suspension is the spherical, green algae mentioned in Table B

141. Describe the process of making a temporary mount of human cheek cells for observation under a microscope.

Ans :

To prepare a slide of human cheek cells, the following steps are taken:

- First, gently scrape the inside of the cheek using the blunt end of a clean toothpick to collect cells.
- Then, place and spread the scraped material evenly in a drop of water on a clean glass slide.
- Finally, add a drop of methylene blue stain to enhance visibility before covering with a coverslip.

142. Describe the appearance of cork as seen by Robert Hooke and explain why he named the structures he saw 'cells'.

Ans :

When Robert Hooke observed a thin slice of cork under his microscope, he saw that it was made of many small, empty spaces. These box-like compartments reminded him of the structure of a honeycomb. Because of their resemblance to the small rooms (cells) in a monastery, he called each small space a 'cell', introducing the term to science.

NODIA

143. What are the main functions of the cell wall and plastids in a plant cell?

Ans :

The primary functions of these plant cell components are:

- **Cell Wall** : It provides rigidity and strength to the plant cell, giving it a firm and definite structure which contributes to overall plant support.
- **Plastids** : Some plastids, like chloroplasts, contain chlorophyll for photosynthesis. Others, in non-green parts, are involved in the storage of various substances.

144. Explain why the dough mixed with yeast, sugar, and warm water rises and develops a different smell.

Ans :

Yeast is a microorganism that grows well in warm conditions and uses sugar as food. It respires, breaking down the sugar to release energy. During this process, carbon dioxide gas is released, which forms bubbles that get trapped and cause the dough to rise, making it fluffy. Yeast also produces a small amount of alcohol, which gives the dough a distinct smell.

145. Explain the concept of 'levels of organization' in multicellular organisms, starting from the most basic unit.

Ans :

The body of a multicellular organism is organized in a complex, hierarchical way. The cell is the basic unit of life. A group of similar cells performing a

specific function forms a tissue. Different tissues are then organized to form an organ. Finally, several organs work together in a coordinated manner to form an organ system that performs a major body function.

146. Why do microorganisms show great diversity, and where can they typically be found?

Ans :

Microorganisms exhibit great diversity, just like plants and animals. They can be found everywhere in the environment, including:

- In water, soil, and air.
- Inside the bodies of other organisms, such as in the human gut.
- Even in extreme climatic conditions, from hot water springs to cold snow zones, showcasing their vast adaptability and diversity.

147. Summa rise the functions of the three primary components of a typical cell : the cell membrane, cytoplasm, and nucleus.

Ans :

The cell membrane encloses the cell, separates it from others, and regulates the entry and exit of substances. The cytoplasm is a jelly-like substance where most life processes occur, and it contains various other cell components. The nucleus acts as the control centre, regulating all the activities within the cell, including growth, and is covered by its own membrane.

148. Explain how some microorganisms play a vital role in cleaning the environment by decomposing organic waste.

Ans :

The process of environmental cleaning by microbes involves:

- Microbes like fungi and bacteria acting on dead organic matter such as plant waste and dead animals.
- Breaking down this complex waste into simpler, nutrient-rich substances like manure.
- Returning these essential nutrients to the soil, which helps other plants grow and completes the natural cycle of recycling waste.

149. Compare and contrast the cellular characteristics of bacteria with those of fungi and protozoa.

Ans :

Bacteria, fungi, and protozoa are all microorganisms but have key differences. Bacterial cells lack a well-defined nucleus, having a nucleoid instead. Fungal cells have a cell wall but no chloroplasts, so they cannot perform photosynthesis. Protozoa are single-celled organisms. This difference in nuclear structure distinguishes bacteria from the cells of yeast, protozoa, algae, and other more complex organisms.

150. What are micro algae, and what are three of their important contributions to the planet and to humans?

Ans :

Microalgae's key contributions include:

- They are microscopic plant-like organisms that are foundational to aquatic food webs, serving as a food source for many animals.
- They produce more than half of the Earth's oxygen through photosynthesis, which is crucial for maintaining a breathable atmosphere.
- Certain types, like Spirulina, are rich in nutrients and are used by humans as health supplements and for making biofuels.

151. How does the structure of a nerve cell or neuron, enable it to perform its function efficiently?

Ans :

The unique structure of a nerve cell is directly related to its function of transmitting messages. Its very long, elongated shape and branched structure at the ends allow it to reach different, often distant, parts of the body. This extensive reach is crucial for passing on messages quickly and efficiently across the body's communication network, connecting various organs and tissues.

152. Explain the difference between unicellular and multicellular organisms, providing an example for each category mentioned in the text.

Ans :

The key distinction lies in the number of cells.

- **Unicellular organisms**, such as bacteria, are made of just one single cell which must perform all life functions necessary for survival.
- **Multicellular organisms**, such as humans and plants, are made up of many cells. In these organisms, different cells are specialised to carry out specific functions.

Click Here to Buy book on Amazon

153. What is the significance of the vacuole in a plant cell, and how does it differ from vacuoles in animal cells?

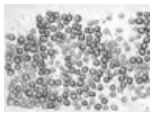
Ans :

In plant cells, the large, central vacuole is a critical organelle. It helps the cell store important substances, assists in getting rid of waste products, and plays a crucial role in maintaining the cell's shape. This provides strength and support to the plant. In contrast, animal cells typically do not have vacuoles, or if present, they are usually very small.

Download INDIA's Best Study app NODIA

154. Compare the characteristics of the two types of Fungi listed in Table 2.2. What is the main structural difference mentioned in the remarks that helps distinguish them?

Table 2.2: Organisms present in soil suspension

S. No.	Diagram	Remarks
1.	Bread mould (Fungi)	Branched filament without chlorophyll having sac-like structure
2.	Mould (Fungi)	Branched filament without chlorophyll having brush-like structure
3.	Algae 	Spherical, presence of chlorophyll a green pigment
4.	Bacteria	Spherical, comma, spiral or rod-shaped, one long hair-like structure and many small hair-like projections around the cell

Ans :

Both fungi are described as branched filaments without chlorophyll. The main structural difference noted is that bread mould has a sac-like structure, while the other mould has a brush-like structure. This variation in their reproductive structures helps in their identification.

155. How do microorganisms contribute to the production of biogas from waste materials?

Ans :

The production of biogas involves the following microbial actions:

- Certain bacteria and fungi that thrive in oxygen-free environments are used for this process.
- These microbes decompose plant and animal waste present in household wastewater or the environment.
- During this decomposition, they release a mixture of gases which includes a high proportion of methane, a fuel that can be used for energy.

NODIA

156. Why did the milk in bowl A turn into curd while the milk in bowl B did not in Activity 2.9?

Ans :

The milk in bowl A, which was lukewarm, turned into curd because the Lactobacillus bacteria added with the curd starter grow well in warm conditions. These bacteria multiplied and fermented the milk. The milk in bowl B remained unchanged because it was kept in a cool place (refrigerator), which inhibited the growth and activity of the Lactobacillus bacteria.

157. Describe the process of preparing a slide of an onion peel, mentioning the purpose of safranin and water rinsing.

Ans :

To prepare an onion peel slide, a thin transparent layer is placed in a few drops of safranin stain. This gives a pinkish colour to the cells, making them easy to see. After about 30 seconds, the peel is transferred to another dish containing water. This step is crucial to rinse the peel and remove any extra stain.

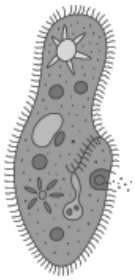
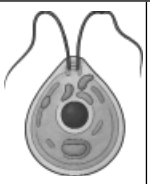
158. Explain how viruses are fundamentally different from other microorganisms like bacteria and fungi.

Ans :

Viruses possess unique characteristics that set them apart. They are microscopic but are acellular, meaning they are not composed of cells. Unlike bacteria or fungi, which can reproduce on their own, viruses are obligate parasites. They can only multiply when they enter a living cell, hijacking the host cell's machinery to replicate themselves, and may infect plants, animals, or bacteria.

159. A student observes a single-celled, moving microorganism in a pond water sample. According to Table , what are the two possible identities of this organism, and what additional feature would help to distinguish between them?

Table 2.1 : Organisms present in pond water

S.N.	Diagram		Remarks
1.	Amoeba (Protozoa)		Single cell, moving, irregular shape
2.	Paramecium (Protozoa)		Single cell, moves from one place to another, movement takes place with the help of specialised structures
3.	Algae		Single cell, looks green because of the presence of green pigment, movement takes place with the help of specialised structures

Ans :

The organism could be an Amoeba or a Paramecium, as both are single-celled and moving protozoa. To distinguish them, one must observe the method of movement; Paramecium uses specialised structures for locomotion, whereas the Amoeba is noted for its irregular shape and movement.

160. How do the different types of cells in the stomach work together to aid in digestion?

Ans :

The stomach's digestive function is a coordinated effort of different cell types:

- Specialised muscle cells are present in the stomach wall. Their contraction and relaxation help to churn the food, mixing it thoroughly.
- Other cells located in the inner lining of the stomach have the function of producing digestive juices and acid.
- These secretions work to chemically break down the food, making digestion possible through this collaborative cellular activity.

161. Why do some plants, like legumes, have a symbiotic relationship with Rhizobium bacteria?

Ans :

This relationship is mutually beneficial. Legume plants like peas and beans have swollen regions on their roots called nodules, which house Rhizobium bacteria. The bacteria receive shelter and nutrients from the plant. In return, these specialised bacteria trap atmospheric nitrogen and convert it into a form that the plant can readily use for its growth and development, reducing the need for chemical fertilisers.

162. What is a 'folds cope' and how does it compare to a high-powered laboratory microscope?

Ans :

A folds cope is a low-cost and foldable microscope made from paper, designed to make scientific observation more accessible. While it successfully magnifies small organisms and makes the microscopic world visible to many people, it may not provide the same high level of detail and magnification as the more powerful and expensive laboratory microscopes that are used for advanced research.

163. What are the key differences in structure observed between a plant cell (like an onion peel cell) and an animal cell (like a human cheek cell)?

Ans :

When comparing plant and animal cells, several key structural differences are apparent. A plant cell is enclosed by a rigid cell wall, which provides strength and support, a feature that is absent in an animal cell. Additionally, plant cells typically

Downloaded from www.pdf.tube

contain a large central vacuole for storage and maintaining shape, while animal cells either lack vacuoles or have very small ones.

164. Describe the characteristics of microorganisms found in pond water.

Ans :

The microorganisms observed in pond water include:

- **Amoeba** : This protozoan is a single, irregularly shaped cell that is capable of movement.
- **Paramecium** : Also a protozoan, this is a single cell that moves from place to place using specialised structures.
- **Algae** : These can be single cells that appear green due to the presence of a green pigment and also move using specialised structures.

165. Why is it incorrect to assume that all microorganisms are harmful? Provide two examples of their beneficial roles from the chapter.

Ans :

It is a misconception that all microbes are harmful; many play an important role in our lives. For example, some bacteria and fungi are decomposers that break down waste and recycle nutrients in the environment. In the kitchen, microorganisms like yeast are essential for making bread rise, while bacteria like Lactobacillus are used to ferment batter for foods like idli and dosa.

166. Explain the role of chlorophyll and chloroplasts in plant cells. Why do fungal cells lack these structures?

Ans :

Chloroplasts are tiny structures within plant cells that contain a green pigment called chlorophyll. This pigment is essential for photosynthesis, the process by which plants make their own food using sunlight. Fungal cells lack both chloroplasts and chlorophyll. As a result, they are unable to perform photosynthesis and cannot produce their own food, relying on other sources for nutrition.

167. What is meant by the term "multicellular," and how do cells in such organisms cooperate for survival?

Ans :

The term "multicellular" refers to organisms, such as plants and animals, whose bodies are made up of many cells. In these complex organisms, cells do not work in isolation. They carry out specialised functions individually, but they also cooperate and coordinate with each other. This teamwork increases the overall efficiency and chances of survival for the entire organism.

NODIA

168. If you were to observe a bacterial cell, what key feature regarding its nucleus would distinguish it from a yeast cell?

Ans :

The most significant distinguishing feature would be the absence of a true nucleus in the bacterial cell. Bacteria do not have a well-defined nucleus enclosed by a nuclear membrane. Instead, their genetic material is located in a region called the nucleoid. In contrast, a yeast cell, which is a fungus, has a well-defined nucleus, a feature that distinguishes it from bacteria.

169. By analysing Tables A and B, what can you infer about the presence of Algae in different environments like pond water and soil?

Table A

Table 2.1 : Organisms present in pond water

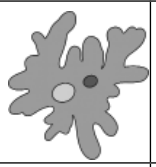
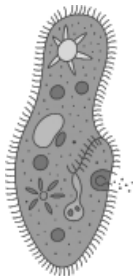
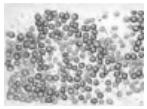
S.N.	Diagram		Remarks
1.	Amoeba (Protozoa)		Single cell, moving, irregular shape
2.	Paramecium (Protozoa)		Single cell, moves from one place to another, movement takes place with the help of specialised structures
3.	Algae		Single cell, looks green because of the presence of green pigment, movement takes place with the help of specialised structures

Table B			
Table 2.2: Organisms present in soil suspension			
S.N.	**Diagram**		**Remarks**
1.	Bread mould (Fungi)		Branched filament without chlorophyll having sac-like structure
2.	Mould (Fungi)		Branched filament without chlorophyll having brush-like structure
3.	Algae		Spherical, presence of chlorophyll a green pigment
4.	Bacteria		Spherical, comma, spiral or rod-shaped, one long hair-like structure and many small hair-like projections around the cell

Ans :

The tables suggest that algae are versatile and can inhabit both aquatic (pond water) and terrestrial (soil) environments. While both samples contain algae, the remarks indicate some differences; the pond algae observed was motile, whereas the soil algae was noted as spherical.

170. What makes the movement of food down the food pipe possible?

Ans :

The movement is made possible by the action of muscle cells. A group of muscle cells is present in the food pipe wall. These cells are thin, flexible, and spindle-shaped, which allows them to contract and relax in a coordinated, wave-like manner. This sequential squeezing action effectively pushes the food down from the mouth towards the stomach for digestion.

171. Why do pickles and murabbas not get infected by microbes even when stored for a long time?

Ans :

The preservation of pickles and murabbas relies on the addition of high concentrations of preservatives like salt or sugar. These substances create an environment that is hostile to microbial life. The high concentration of salt or sugar draws water out of any microbial cells that land on the food, inhibiting their growth and preventing the food from spoiling or getting infected.

172. How does a single egg cell develop into a complete multicellular organism?

Ans :

The life of complex multicellular organisms begins with a single cell, the 'egg'. This initial cell possesses an amazing and unique ability. Through a process of repeated division, the egg cell divides again and again, creating more cells. These cells then differentiate and organise to form tissues, organs, and eventually a complete living being made up of many cells.

173. How do some plant cells form long tubes, and what is the primary function of these structures?

Ans :

Some plant cells exhibit structural variation where they grow into elongated, tube-like shapes. These cells then join end-to-end to form continuous, long tubes. The primary function of these specialised tube-like structures is transport. They act as a vascular system, helping to carry essential substances like water from the roots throughout the entire plant, ensuring its survival and growth.

LONG ANSWER QUESTIONS

174. Explain in detail the steps for preparing and observing an onion peel under a microscope,.

Ans :

The process for preparing an onion peel slide involves these key steps:

Click Here to Buy book on Amazon

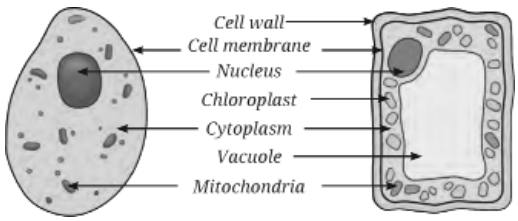
- First, a thin, transparent layer called the onion peel is carefully pulled from the inner surface of an onion piece using forceps.
- The peel is then placed in a drop of safranin stain for 30 seconds to colour the cells, making them visible, and then rinsed.
- Next, the stained peel is carefully placed on a glass slide, and a drop of glycerin is added over it to prevent drying.
- A coverslip is slowly placed over the peel at an angle to avoid air bubbles, and any excess glycerin is wiped away.
- Finally, the prepared slide is viewed under a microscope to observe the rectangular, closely arranged plant cells.

175. Compare and contrast the key structural features of a typical plant cell and a typical animal cell based on the information and diagrams provided.

Ans :

Plant and animal cells share some common features but also have distinct differences:

- **Cell Wall** : A key difference is the presence of a rigid cell wall outside the cell membrane in plant cells, which provides strength and support. Animal cells lack this structure.
- **Vacuole** : Plant cells typically have one large, central vacuole that stores substances, gets rid of waste, and maintains cell shape. In animal cells, vacuoles are usually absent or very small.
- **Plastids** : Plant cells contain plastids, such as chloroplasts with green chlorophyll for photosynthesis. Animal cells do not have plastids.
- **Common Structures** : Both cell types have a cell membrane, a nucleus that controls cell activities, and cytoplasm where life processes occur.



A schematic drawing of (a) An animal cell and (b) A plant cell. (The colours are to show different parts of the cell)

176. Describe the hierarchical levels of organization in a complex living organism, from the simplest to the most complex level.

Ans :

The organization of a complex organism follows a specific hierarchy:

- **Cell** : This is the most basic structural and functional unit of life, like a single brick in a wall.
- **Tissue** : A group of similar cells comes together to form a tissue, which is specialized to perform a particular function.
- **Organ** : Different types of tissues are organized and grouped together to form an organ, such as the stomach, which performs more complex functions.
- **Organ System** : Several organs work together in a coordinated way to form an organ system, like the digestive system, responsible for a major body function.
- **Organism** : Finally, all the different organ systems together make up a complete, functional organism, like a human or an animal.

NODIA

177. Explain the beneficial role of microorganisms in the process of decomposition and nutrient recycling in the environment.

Ans :

Microorganisms are essential for maintaining environmental balance through decomposition:

- Certain microbes, primarily fungi and bacteria found in soil, act on waste materials like fallen leaves, plant waste, and bodies of dead animals.
- They break down these complex organic materials into simpler, nutrient-rich substances. This resulting material is known as manure.
- This process effectively recycles waste, preventing its accumulation in the environment and cleaning up our surroundings.
- The nutrients released from the decomposed matter go back into the soil, increasing its fertility and helping new plants to grow better.

Download INDIA's Best Study app NODIA

178. Describe how yeast is used in the kitchen to make dough for bread soft and fluffy, mentioning the key ingredients and processes involved.

Ans :

The process of using yeast to leaven dough involves several key factors:

- Yeast, a unicellular fungus, is added to flour along with sugar and warm water to create a suitable environment for its growth.
- The yeast feeds on the sugar and, like other organisms, respires to release energy for its life processes. It grows well in warm conditions.
- A key byproduct of this respiration process is the release of carbon dioxide gas. This gas forms numerous tiny bubbles within the dough.
- These trapped gas bubbles cause the dough to expand in volume, or "rise," which results in the soft, fluffy texture of bread and cakes.
- A small amount of alcohol is also produced, which contributes to the distinct smell of the fermented dough.

179. Summarise the discovery of the 'cell' by Robert Hooke and the contributions of Antonie van Leeuwenhoek that followed.

Ans :

The discovery of the microscopic world began with these pioneers:

- In 1665, scientist Robert Hooke published his book Micrographia, showcasing detailed drawings of things seen through his microscope.
- He famously observed a thin slice of cork and saw that it was made of many small, empty spaces which he named 'cells'.
- Around the same time, Antonie van Leeuwenhoek, a Dutch scientist, improved upon lens-making technology, allowing him to build more powerful microscopes.
- Using his superior instruments, Leeuwenhoek became the first person to clearly see and provide detailed descriptions of tiny living things like bacteria.
- For this pioneering work in observing microbes, he is famously known today as the "Father of Microbiology."

180. Explain the symbiotic relationship between Rhizobium bacteria and legume plants, and describe its importance for agriculture.

Ans :

This symbiotic relationship is crucial for soil fertility and agriculture:

- Roots of certain legume plants like peas and lentils have swollen regions known as nodules, which are home to Rhizobium bacteria.
- The bacteria receive shelter and nourishment from the plant, while the plant benefits from the bacteria's unique ability.
- These bacteria perform nitrogen fixation, a process where they trap nitrogen gas from the atmosphere and convert it into compounds the plant can absorb and use.
- This natural process enriches the soil with nitrogen, which helps plants grow better without the need for adding artificial chemical fertilisers.
- This is why farmers often practice crop rotation, growing legumes to naturally replenish soil nitrogen for subsequent crops.

181. Discuss the diversity of microorganisms, covering their cellular structure, shapes, and the wide range of habitats they occupy.

Ans :

Microorganisms exhibit immense diversity in almost every aspect of their existence:

- **Cellular Structure** : They can be unicellular, consisting of a single cell like bacteria and Amoeba, or multicellular, having many cells like some fungi and algae.
- **Shapes** : Microbes come in various shapes. Observations show spherical, rod-shaped, comma-shaped, spiral, or even irregular shapes, depending on the species.
- **Habitats** : Their adaptability is remarkable. They are found everywhere - in water, soil, and air, and can even survive inside our bodies.
- **Extreme Environments** : This diversity extends to extreme climatic conditions, with some microbes thriving in hot water springs, while others are found in icy cold snow zones.

182. Detail the roles of the three main parts of a cell—cell membrane, cytoplasm, and nucleus—in sustaining the life of the cell.

Ans :

These three components are fundamental to a cell's function and survival:

- **Cell Membrane** : This outer layer encloses the cell's contents and separates it from its surroundings. It is porous, acting as a gatekeeper that allows essential materials to enter and waste to exit.
- **Cytoplasm** : This is the jelly-like substance filling the cell. It contains vital compounds like proteins and fats, and it is the site where

NODIA

most of the cell's metabolic life processes take place.

- **Nucleus** : Often called the control centre, the nucleus regulates all the activities that occur within the cell. It governs functions like growth and maintenance, ensuring the cell operates correctly.

183. Explain the role and importance of microalgae in both the environment and for human use.

Ans :

Microalgae are tiny organisms with a massive impact on the planet:

- **Environmental Role** : These microscopic plant-like organisms live in water and perform photosynthesis. In doing so, they produce more than half of the Earth's total oxygen supply, which is vital for life.
- **Food Source** : They form the base of many aquatic food chains, serving as a primary food source for a wide variety of aquatic animals.
- **Human Use** : Humans also utilize microalgae. Some types, like Spirulina and Chlorella, are harvested for use as highly nutritious health supplements and medicines due to their rich nutrient content.

Biofuel and Cleaning : They also have emerging applications in biotechnology, where they are used to help in cleaning water and are being developed as a source for making bio-fuel.

CASE BASED QUESTIONS

184. A student prepares a slide of an onion peel to observe under a microscope. She sees rectangular structures arranged like bricks. She identifies a distinct outer layer called the cell wall, which provides a fixed shape. Inside the cell wall, she sees the cell membrane, a nucleus, and cytoplasm. She learns this rigid structure is a key difference between plant and animal cells.

Questions:

1. What are the three basic parts of a cell that are common to both plants and animals?
2. What is the specific function of the cell wall in the onion cells?
3. Why is the "bricks in a wall" a good analogy for the arrangement of the observed onion cells?

Ans :

1. The three basic parts are the cell membrane, cytoplasm, and nucleus.
2. The cell wall provides rigidity and strength to the plant cells.
3. The analogy is fitting because the cells are rectangular, closely arranged without gaps, and provide structure and support to the plant, much like bricks do for a wall.

185. In a baking class, a student mixes flour, sugar, and warm water in two bowls. In one bowl, he adds yeast powder. After a few hours, he observes that the dough with yeast has risen and become fluffy. This happens because the yeast, a type of fungus, respires and releases carbon dioxide gas, which gets trapped and makes the dough rise.

Questions:

1. To which group of microorganisms does yeast belong?
2. Based on the case study, explain the scientific reason why the dough with yeast became fluffy.
3. Why was it important to add warm water to the flour along with the yeast?

Ans :

1. Yeast belongs to the fungi group of microorganisms.
2. The yeast respires, releasing carbon dioxide gas. These gas bubbles get trapped in the dough, making it soft and fluffy.
3. Yeast grows well in warm conditions, so warm water provides the optimal temperature for the microorganism to multiply and start the process of respiration.

186. A class examines a drop of pond water under a microscope and discovers a hidden world of tiny, single-celled organisms. They identify an Amoeba with its irregular, changing shape and a slipper-shaped Paramecium. These organisms, classified as protozoa, are complete living beings that carry out all life functions within just one cell, highlighting the complexity of unicellular life.

Questions:

1. What are organisms that are made of just one cell called?
2. Why is a microscope essential for observing organisms like Amoeba and Paramecium?
3. The Amoeba has an irregular shape. How does this compare to the fixed shape of an onion cell, and what cellular structure is responsible for this difference?

Downloaded from www.pdf.tube

Ans :

1. Organisms made of one cell are called unicellular organisms.
2. A microscope is essential because these organisms are too small to be seen with the naked eye.
3. The onion cell has a fixed, rectangular shape due to its rigid cell wall, whereas the Amoeba lacks a cell wall, allowing it to have an irregular and constantly changing shape.

187. After observing onion cells, students prepare a slide of their own cheek cells. They see polygon-shaped structures that lack the rigid outer cell wall. While both cell types have a cell membrane, cytoplasm, and a nucleus, the absence of the cell wall in cheek cells makes them less rigid. This comparison highlights a fundamental structural difference between animal and plant cells.

Questions:

1. What are the three basic parts found in both the onion cells and the cheek cells?
2. What key structure is present in the plant cell but absent in the animal cell shown in this scenario?
3. Why is having a rigid cell wall advantageous for a plant but not for an animal's cheek cell?

Ans :

1. Both cell types have a cell membrane, cytoplasm, and a nucleus.
2. The onion (plant) cell has a cell wall, which is absent in the cheek (animal) cell.
3. The rigid cell wall provides strength and structural support that plants need to stand upright. Animal cells, like those in the cheek, require flexibility for movement and are part of a body supported by a skeletal system.

Download INDIA's Best Study app NODIA

188. A gardener shows students a compost pit filled with fruit peels, vegetable waste, and leaves. After a few weeks, this waste turns into a dark, nutrient-rich manure. The gardener explains that this transformation is done by microorganisms like bacteria and fungi in the soil. They break down the waste, cleaning the environment and recycling valuable nutrients back into the soil.

Questions:

1. What types of microorganisms are primarily responsible for breaking down the waste into manure?
2. Explain how the action of these microbes benefits the soil.
3. What would likely happen to our environment if these decomposing microorganisms did not exist?

Ans :

1. Microorganisms like fungi and bacteria are responsible for the decomposition.
2. They break down waste into simpler, nutrient-rich manure, which increases the fertility of the soil and helps plants grow better.
3. If decomposers did not exist, dead plants, animals, and other organic waste would not break down. The environment would become filled with waste, and essential nutrients would not be recycled back into the soil.

NODIA

189. A farmer explains to his daughter that he rotates his crops, planting legumes like peas one season. He shows her the small swellings, called nodules, on the roots of a pea plant. He tells her that inside these nodules live special bacteria called Rhizobium. These bacteria can trap nitrogen from the air and make it useful for the plant, naturally enriching the soil.

Questions:

1. What are the swollen regions on the roots of legume plants called?
2. What is the specific function of the Rhizobium bacteria living in these nodules?
3. Why does planting legumes in rotation with other crops reduce the need for chemical fertilizers?

Ans :

1. The swollen regions on the roots are called nodules.
2. Rhizobium bacteria trap nitrogen from the air and make it available for the plants to use.
3. This practice naturally increases the nitrogen content in the soil, keeping it fertile and healthy for the next crop, thus reducing the need to add artificial nitrogen fertilizers.

190. A health article discusses Spirulina, a microalga often called a "superfood". These microscopic, plant-like organisms make their own food using sunlight and produce more than half of the Earth's oxygen. Spirulina is rich in protein and nutrients, making it a popular health supplement. This highlights the vital role that even tiny, invisible organisms play in our ecosystem and health.

Questions:

1. What are microalgae?
2. What two major contributions do microalgae make to the planet's ecosystem?
3. The text mentions Spirulina farming is a "feasible livelihood opportunity." Why might farming a microorganism be a good source of income?

Ans :

1. Microalgae are microscopic, plant-like organisms that live in water, soil, and air.
2. They produce more than half of the Earth's oxygen supply and serve as a food source for many aquatic animals.
3. Farming a microorganism like Spirulina can be a good livelihood because it produces a high-value product (a nutrient-rich superfood) that can be used for health supplements and medicines.

191. A student observes her mother making curd. Her mother adds a spoonful of existing curd to lukewarm milk and leaves it in a warm place for a few hours. The milk turns into curd. She explains that the spoonful of curd contains millions of Lactobacillus bacteria. These bacteria multiply in the warm milk and ferment it, producing lactic acid, which gives curd its texture and sour taste.

Questions:

1. What is the name of the bacterium that helps in the formation of curd?
2. Why is it necessary to add a small amount of curd (a "starter") to the milk?
3. Why did the mother use lukewarm milk instead of cold milk?

Ans :

1. The bacterium is named Lactobacillus.
2. The starter curd contains the necessary bacteria (Lactobacillus) which are needed to begin the fermentation process in the fresh milk.
3. Lactobacillus bacteria grow and multiply well in warm conditions, so using lukewarm milk provides the optimal temperature for the curd to form effectively.

192. In the 17th century, scientist Robert Hooke used his self-made microscope to look at a thin slice of cork. He saw that it was made of many small, empty spaces that reminded him of a honeycomb. He called these small spaces "cells," marking the first time this term was used in science to describe the basic unit of life.

Questions:

1. What material did Robert Hooke first observe to identify "cells"?
2. What did the small spaces in the material remind Hooke of?
3. How did the invention of the microscope change the world of biology forever?

Ans :

1. Robert Hooke observed a thin slice of cork.
2. The small, empty compartments reminded him of a honeycomb.
3. The microscope opened up a hidden world filled with tiny living creatures that were invisible to the naked eye, allowing scientists to discover that all living things are made of cells, the basic unit of life.

193. An animated video in a science class shows how a complex organism is built. It starts with a single muscle cell. A group of these cells forms a muscle tissue. Different tissues, including muscle tissue, come together to form an organ like the stomach. The stomach, along with other organs, forms the digestive system. Finally, all organ systems together create a complete organism.

Questions:

1. What is the basic unit of life in this organizational structure?
2. According to the levels of organization, what is formed when different tissues are organized together?
3. Explain the relationship between a cell, a tissue, and an organ using the example of the stomach.

Ans :

1. The cell is the basic unit of life.
2. When different tissues are organized together, they form an organ.
3. A single muscle cell is the basic unit. A group of similar muscle cells forms muscle tissue. This muscle tissue, along with other types of tissues, works together to form the stomach, which is an organ.

194. A textbook shows images of two different human cells : a muscle cell and a nerve cell. The muscle cell is long and spindle-shaped, which allows it to contract and relax to cause movement. The nerve cell is very long and has many branches. This structure helps it carry messages quickly over long distances to different parts of the body.

Click Here to Buy book on Amazon

Questions:

1. What is the shape of a muscle cell?
2. How does the long, branched structure of a nerve cell help it perform its function?
3. Based on this case, what can you conclude about the relationship between a cell's structure and its function?

Ans :

1. A muscle cell is shaped like a spindle.
2. Its elongated shape and branched structure help it reach different parts of the body to pass on messages quickly.
3. The conclusion is that cells have unique and specialized shapes and structures that are directly related to the specific functions they need to perform within an organism.

195. A student reads that viruses are microscopic but are different from bacteria and other microorganisms because they are acellular (not made of cells). A virus cannot multiply on its own. It must enter a living cell of a host organism—like a plant, animal, or even a bacterium—to reproduce. This unique characteristic places them on the borderline between living and non-living things.

Questions:

1. What does it mean for a virus to be "acellular"?
2. Under what condition can a virus multiply?
3. Why are viruses considered different from other microorganisms like bacteria and protozoa?

Ans :

1. "Acellular" means that viruses are not made of cells.
2. A virus can multiply only when it enters a living cell of a host organism.
3. Viruses are different because they are not cells and cannot reproduce on their own, whereas bacteria and protozoa are unicellular organisms that can carry out all life functions independently within their single cell.

196. A student leaves a slice of bread and an orange on the kitchen counter for a few days. He observes a cotton-like growth appearing on both food items. His teacher explains that this is a type of fungus called mould, which is a microorganism. The mould grew because microorganisms are present everywhere in the air and find suitable conditions on the food to multiply.

NODIA

Questions:

1. What type of microorganism caused the cotton-like growth on the food?
2. Where did the microbes that spoiled the food likely come from?
3. The chapter mentions that pickles do not get spoiled easily because of preservatives like salt and sugar. How do these substances prevent the growth of microbes?

Ans :

1. The growth was caused by a fungus (mould).
2. The microbes likely came from the air, as they can be found everywhere.
3. High concentrations of salt or sugar act as preservatives because they create an environment where most microorganisms cannot grow or multiply.

197. When observing different types of microbial cells, a student learns that bacterial cells have a unique feature. Unlike plant, animal, or fungal cells, a bacterium does not have a well-defined nucleus enclosed by a nuclear membrane. Instead, its genetic material is located in a region within the cytoplasm called the nucleoid. This makes bacterial cells structurally simpler than many other cells.

Questions:

1. Do bacterial cells have a well-defined nucleus?
2. What is the region in a bacterial cell that contains its genetic material called?
3. What is a key structural feature that distinguishes a bacterial cell from an animal or plant cell?

Ans :

1. No, bacteria do not have a well-defined nucleus with a nuclear membrane.
2. The region is called the nucleoid.
3. A key feature is the absence of a membrane-bound nucleus. Animal and plant cells have a true nucleus, while bacteria have a nucleoid region instead.

198. During a lesson on cells, a teacher mentions that not all cells are microscopic. She explains that the yolk of an ostrich egg is actually a single, massive cell—the largest known cell in the living world. The hard outer shell and the egg white are extra, non-cellular materials that protect and nourish this giant cell as it develops into a new organism.

Questions:

1. Which part of an ostrich egg is considered the single largest cell?
2. What is the function of the hard shell and the egg white?
3. This example shows that a single cell can be seen with the naked eye. Why then do we generally need microscopes to study cells?

Ans :

1. The yolk (the yellow part) of the ostrich egg is the largest single cell.
2. The shell provides protection, and the white liquid (albumen) nourishes the cell during its development.
3. While a few cells like the ostrich egg yolk are exceptionally large, the vast majority of cells in all living organisms (plants, animals, and microbes) are microscopic and too small to be seen without the aid of a microscope.

****

Downloaded from www.pdf.tube

CHAPTER 3

HEALTH : THE ULTIMATE TREASURE

NODIA

SUMMARY

1. WHAT IS HEALTH?

1.1 The Complete Definition of Health

According to the World Health Organization (WHO), health is defined as a "state of complete physical, mental, and social well-being, and not merely the absence of disease".Being healthy is not just about not falling sick; it also involves feeling good physically, thinking positively, and having good relationships with others.

1.2 The Three Aspects of Health

True health is a balance of three main areas:

Aspects of health

1. Physical Health : Taking care of your body through diet, exercise, and cleanliness.
2. Mental Health : Maintaining a positive mindset, managing stress, and feeling good emotionally.
3. Social Health : Having strong, positive relationships with family, friends, and the community.

Download INDIA's Best Study app NODIA

2. HOW TO STAY HEALTHY

2.1 Maintaining a Healthy Lifestyle

A healthy lifestyle is crucial for overall well-being. This includes:

1. Eating a Balanced Diet : Consume plenty of fruits, vegetables, and whole grains. Avoid excessive processed, fatty, or sugary foods.

Eat a balanced diet

2. Staying Physically Active : Engage in regular activities like playing outdoors, walking, running, or cycling.

Stay physically active

3. Getting Enough Rest : Proper sleep helps your body and mind recover.

Download INDIA's Best Study app NODIA

Get enough sleep

4. Managing Stress : Practice relaxation techniques like yoga or simple breathing exercises.

Manage stress

5. Avoiding Harmful Substances : Say 'NO' to tobacco, alcohol, and addictive drugs.

Say no to smoking or alcohol

2.2 Importance of a Clean Environment

Your surroundings significantly impact your health. Clean air and water are essential. Air pollution from vehicles and factories can cause respiratory problems like coughing and asthma.

Download INDIA's Best Study app NODIA

Living in a clean, hygienic area reduces the chances of falling sick from diseases spread by flies and mosquitoes.

3. UNDERSTANDING DISEASES

3.1 Signs vs. Symptoms

A diseases a condition that negatively affects the normal functioning of the body or mind. Symptoms are what a person feels when they are unwell, such as pain, tiredness, or desensitizers indicators that can be seen or measured by others, like a fever, a rash, or high blood pressure.

3.2 Types of Diseases

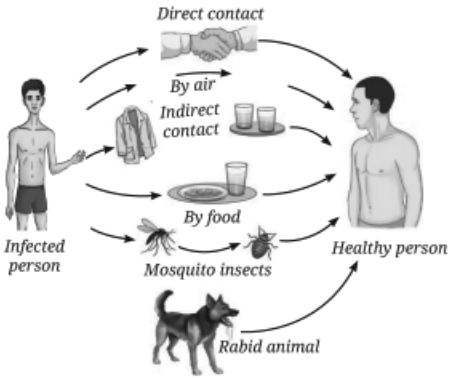
Diseases are broadly grouped into two types:

1. Communicable Diseases : Caused by disease-causing organisms called pathogens(e.g., bacteria, viruses).They can spread from an infected person to a healthy person. Examples include the flu, chickenpox, typhoid, and COVID-19.
4. Non-Communicable Diseases (NCDs) : These diseases are not caused by pathogens and do not spread from person to person.They are usually linked to lifestyle factors, genetics, and the environment. Examples include diabetes, heart disease, asthma, and cancer. NCDs are now the leading cause of death in India.

4. COMMUNICABLE (INFECTIOUS) DISEASES

4.1 How They Spread

Pathogens can enter our bodies and spread in several ways :



Common methods of transmission of diseases

1. Through the Air : When an infected person coughs or sneezes.

Click Here to Buy book on Amazon

2. Direct/Indirect Contact : Shaking hands with an infected person or sharing their personal items like towels.
3. Contaminated Food and Water : Consuming food or water that contains pathogens.
4. Through Vectors : Insects like mosquitoes and houseflies can carry pathogens and transmit them to humans.

4.2 Common Examples and Prevention

1. Air-borne (e.g., Common Cold, TB):Prevention includes washing hands, covering your mouth when coughing, and vaccination.
2. Water/Food-borne (e.g., Cholera, Typhoid):Prevention involves drinking boiled water, eating properly cooked food, and maintaining good hygiene.
3. Vector-borne (e.g., Malaria, Dengue):Prevention includes using mosquito nets and repellents and preventing mosquitoes from breeding in stagnant water.

5. NON-COMMUNICABLE DISEASES (NCDS)

5.1 Causes and Types

1. NCDs are often called lifestyle diseases because they are linked to habits like an unhealthy diet and lack of physical activity.
2. Deficiency Diseases : A type of NCD caused by a lack of specific nutrients in the diet, such as scurvy (lack of Vitamin C) or anaemia (lack of iron).
3. Chronic Diseases : Diseases that last for a long time (more than 3 months), such as diabetes and asthma.

Download INDIA's Best Study app NODIA

5.2 Focus on Diabetes

Diabetes is a major health concern in India, affecting both children and adults. It develops due to factors like hormonal imbalances, unhealthy eating habits, lack of physical activity, and being overweight.

6. DISEASE PREVENTION AND TREATMENT

6.1 The Body's Defence : Immunity

Immunity is the body's natural ability to fight off diseases. This is handled by the immune system, which protects the body from harmful pathogens.

6.2 Prevention Through Vaccines

1. A vaccine trains the immune system to recognise and fight specific pathogens without causing the disease.
2. They are made from weakened, dead, or harmless parts of the pathogen.
3. Vaccines are a preventive measure; they protect you from getting sick but do not cure the disease once you have it.
4. Mass vaccination campaigns have successfully eradicated diseases like smallpox.

6.3 Treatment with Antibiotics

Antibiotics are medicines used to treat diseases caused by bacteria. They work by killing the bacteria or stopping their growth.
Important : Antibiotics do not work against viruses, so they cannot cure illnesses like the common cold or flu.

6.4 The Challenge of Antibiotic Resistance

1. Antibiotic resistance occurs when bacteria change and are no longer killed by antibiotics.
2. This is a serious global health threat, caused by the overuse and incorrect use of antibiotics.
3. To prevent resistance, antibiotics should only be used when prescribed by a doctor and the full course must be completed.

NCERT EXERCISE

1. Group the diseases shown in the images as communicable or non-communicable.

Ans :

1. Communicable Diseases : Cold and flu, Typhoid, Chickenpox
2. Non-communicable Diseases : Diabetes, Asthma

2. Diseases can be broadly grouped into communicable and non-communicable diseases. From the options given below, identify the non-communicable diseases.

Downloaded from www.pdf.tube

(i) Typhoid
(ii) Asthma
(iii) Diabetes
(iv) Measles
(a) (i) and (ii)
(b) (ii) and (iii)
(c) (i) and (iv)
(d) (ii) and (iv)

Ans :

(b) (ii) and (iii)
Non-communicable diseases like asthma and diabetes are not caused by pathogens and do not spread from one person to another. Typhoid and measles are communicable diseases.

3. There is a flu outbreak in your school. Several classmates are absent, while some are still coming to school coughing and sneezing.
(i) What immediate actions should the school take to prevent further spread?
(ii) If your classmate, who shares the bench with you, starts showing symptoms of the flu, how can you respond in a considerate way without being rude or hurtful?
(iii) How can you protect yourself and others from getting infected in this situation?

Ans :

(i) The school should advise students who are unwell to stay at home and rest. It should also encourage all students to practice basic hygiene, such as covering their mouth and nose while coughing or sneezing and wearing a mask.
(ii) I can gently suggest to my classmate that they should inform the teacher or their parents about how they are feeling. I could explain that resting at home will help them recover faster and also prevent the flu from spreading to others in the class.
(iii) To protect myself and others, I can:
- Wash my hands frequently with soap and water.
- Avoid sharing personal items like water bottles and handkerchiefs.
- Wear a mask to protect myself from germs spread through the air.
- Maintain a safe distance from those who are coughing or sneezing.

4. Your family is planning to travel to another city where malaria is prevalent.
(i) What precautions should you take before, during, and after the trip?
(ii) How can you explain the importance of mosquito nets or repellents to your sibling?
(iii) What could happen if travellers ignore health advisories in such areas?

Ans :

(i) We should take the following precautions:
- Before : Pack long-sleeved clothes, mosquito repellents, and a mosquito net.
- During : Use mosquito nets while sleeping, apply repellents, and wear long-sleeved clothes, especially during the evening.
- After : Watch for symptoms like fever and chills, and consult a doctor if they appear.

(ii) I can explain that malaria is spread by mosquitoes. These insects act as vectors and carry the disease-causing germs. Using mosquito nets and repellents creates a protective barrier that prevents mosquitoes from biting us and spreading the disease.
(iii) If travellers ignore health advisories, they risk being bitten by infected mosquitoes and contracting malaria. This can lead to serious illness with symptoms like high fever, periodic chills, and profuse sweating.

5. Your uncle has started smoking just to fit in with his friends, even though it is well known that smoking can seriously harm health and even cause death.
(i) What would you say to him to make him stop, without being rude?
(ii) What would you do if your friend offers you a cigarette at a party?
(iii) How can schools help prevent students from indulging in such harmful habits?

Ans :

(i) I would express my concern for his well-being and gently tell him that smoking is a harmful habit that can cause dangerous diseases like cancer. I would request him to think about his health and the people who care for him.
(ii) I would politely but firmly say 'NO'. The chapter advises us to say 'NO' to harmful substances like tobacco.
(iii) Schools can conduct health awareness programs to educate students about the dangers of smoking and other harmful substances. They can encourage healthy habits like regular exercise, a balanced diet, and engaging in positive activities to help students make healthy life choices.

NODIA

6. Saniya claims to her friend Vinita that "Antibiotics can cure any infection, so we don't need to worry about diseases." What question(s) can Vinita ask her to help Saniya understand that her statement is incorrect?

Ans :

To help Saniya understand, Vinita could ask the following questions:

1. "Do antibiotics also work against viral infections like the common cold and flu?" (This would point out that antibiotics only work against bacteria).
2. "What happens if we take antibiotics when they are not needed?" (This would introduce the problem of antibiotic resistance).

7. The following table contains information about the number of dengue cases reported in a hospital over a period of one year. Critically analyse your findings and answer the following:

S. No.	**1**	**2**	**3**	**4**	**5**	**6**
Month	**January**	**February**	**March**	**April**	**May**	**June**
No. of dengue cases	10	12	15	18	22	40

S. No.	**7**	**8**	**9**	**10**	**11**	**12**
Month	July	Aug.	Sep.	Oct.	Nov.	Dec.
No. of dengue cases	65	65	65	30	30	20

(i) In which three months were the dengue cases highest?

(ii) In which month(s) were the cases lowest?

(iii) What natural or environmental factors during the peak months might contribute to the increase in dengue cases?

(iv) Suggest a few preventive steps that the community or government can take before the peak season to reduce the spread of dengue.

Ans :

(i) According to the data, the dengue cases were highest in July, August, and September, with 65 cases reported each month.

(ii) The cases were lowest in January, with only 10 cases reported.

(iii) Dengue is spread by mosquitoes, which breed in still or stagnant water. The peak months of July, August, and September often coincide with the monsoon season, when rainfall leads to the collection of water in open containers, pits, and coolers. This provides ample breeding grounds for mosquitoes, leading to an increase in dengue cases.

(iv) The community and government can take the following steps:

- Run awareness campaigns to educate people on how to prevent mosquito breeding.
- Ensure there is no stagnant water in and around homes and in public places.
- Conduct regular fogging in residential areas to kill adult mosquitoes.
- Encourage people to use mosquito nets and repellents.

Download INDIA's Best Study app NODIA

8. Imagine you are in charge of a school health campaign. What key messages would you use to reduce communicable and non-communicable diseases?

Ans :

My key messages would be:

For Communicable Diseases:

- "Keep Clean, Stay Healthy" : Wash hands regularly and maintain personal hygiene.
- "Cover Your Cough, Don't Share the Germs" : Cover your mouth and nose when you cough or sneeze.
- "Get Your Shots" : Ensure you are vaccinated to prevent serious diseases.

For Non-Communicable Diseases:

- "Eat Right, Live Bright" : Eat a balanced diet and avoid junk food.
- "Move More, Sit Less" : Stay physically active and limit screen time.
- "Say NO to Harmful Habits" : Avoid tobacco, alcohol, and other addictive substances.

9. It is recommended that we should not take an antibiotic for a viral infection like a cold, a cough, or flu. Can you provide the possible reason for this recommendation?

Ans :

Antibiotics are medicines that work only against infections caused by bacteria. They are not effective against viruses, which cause infections like a cold, cough, or flu. Taking antibiotics for a viral infection is ineffective and can contribute to the problem of antibiotic resistance.

Click Here to Buy book on Amazon

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

10. Which disease(s) among the following may spread if drinking water gets contaminated by the excreta from an infected person?
Hepatitis A, Tuberculosis, Poliomyelitis, Cholera, Chickenpox.

Ans :

Hepatitis A, Poliomyelitis, and Cholera may spread if drinking water is contaminated. These diseases are known to be transmitted through contaminated water and food. Tuberculosis and Chickenpox primarily spread through the air.

11. When our body encounters a pathogen for the first time, the immune response is generally low but on exposure to the same pathogen again, the immune response by the body is much more compared to the first exposure. Why is it so?

Ans :

This happens because our body's immune system has a memory. When a pathogen enters for the first time, the immune system learns to recognise and fight it. This is called acquired immunity. If the same pathogen enters the body a second time, the immune system "remembers" it and launches a much faster and stronger attack, often preventing the disease from developing at all.

MULTIPLE CHOICE QUESTION

12. According to the World Health Organization (WHO), health is defined as a state of complete _____.
(A) Physical, mental, and social well-being
(B) Physical fitness only
(C) Absence of any disease
(D) Mental and emotional stability

Ans :

(A) Physical, mental, and social well-being
The WHO defines health holistically, not just as the absence of illness. This comprehensive view includes physical wellness, a positive mental state, and the ability to maintain healthy social relationships and function well within a community.

13. Which of the following diseases is classified as non-communicable?
(A) Common cold (B) Chickenpox
(C) Cholera (D) Diabetes

Ans :

(D) Diabetes
Diabetes is a non-communicable disease, meaning it cannot be spread from one person to another. It is typically caused by a combination of genetic, lifestyle, and environmental factors, unlike communicable diseases, which are caused by pathogens.

14. What is the primary cause of communicable diseases?
(A) Making a series of unhealthy lifestyle choices.
(B) Disease-causing organisms known as pathogens.
(C) Having certain specific genetic defects from birth.
(D) A lack of specific nutrients in one's daily diet.

Ans :

(B) Disease-causing organisms known as pathogens
Communicable, or infectious, diseases are caused by pathogens such as bacteria, viruses, fungi, or protozoa. These microscopic organisms can invade the body and disrupt its normal functions, leading to illness that can be transmitted to others.

15. Who discovered the first vaccine by observing that exposure to cowpox protected against smallpox?
(A) Alexander Fleming
(B) Kamal Ranadive
(C) Edward Jenner
(D) Maharaj Kishan Bhan

Ans :

(C) Edward Jenner
In the late 1700s, English doctor Edward Jenner pioneered vaccination. He scientifically tested his observation that milkmaids who contracted the mild disease cowpox were immune to the deadly smallpox, leading to the development of the first vaccine.

16. Covering your mouth and nose while coughing or sneezing is a preventive measure primarily for diseases that spread through _____.
(A) The air (B) Contaminated water
(C) Insect vectors (D) Direct contact

Ans :

(A) The air
When an infected person coughs or sneezes, they release tiny droplets containing pathogens into the air. Covering the mouth and nose traps these droplets, preventing the airborne transmission of respiratory illnesses like the common cold and flu.

NODIA

17. What is the main difference between a 'symptom' and a 'sign' of a disease?
(A) A symptom is measured by a doctor, while a sign is felt by a patient.
(B) Symptoms are only for communicable, while signs are for non-communicable.
(C) There is no real difference; the two terms are interchangeable.
(D) A symptom is felt by a patient, while a sign can be seen or measured.

Ans :

(D) A symptom is felt by a patient, while a sign can be seen or measured
A symptom is a subjective experience reported by the patient, such as pain or tiredness. A sign is an objective indication of disease that can be observed or measured by someone else, like a fever or a rash.

Download INDIA's Best Study app NODIA

18. What is the function of the body's immune system?
(A) To digest food and absorb nutrients.
(B) To help the body fight against diseases.
(C) To circulate blood throughout the body.
(D) To regulate body temperature.

Ans :

(B) To help the body fight against diseases
The immune system is the body's defense network against pathogens. It is a complex system of cells, tissues, and organs that work together to recognize and attack harmful germs like bacteria and viruses, thereby protecting the body from infections.

19. Diseases like diabetes and asthma that persist for a long time (more than 3 months) are referred to as _____.
(A) Acute diseases
(B) Vector-borne diseases
(C) Chronic diseases
(D) Deficiency diseases

Ans :

(C) Chronic diseases
A chronic disease is a long-lasting condition that usually requires ongoing medical attention or limits daily activities. Unlike acute illnesses that are often brief, chronic diseases such as diabetes and asthma persist over an extended period.

20. Which of the following statements about antibiotics is incorrect?
(A) They are effective against viral infections like the common cold.
(B) They are highly effective in killing various types of bacteria.
(C) They were first discovered and isolated by Alexander Fleming.
(D) Their overuse can lead to the problem of antibiotic resistance.

Ans :

(A) They are effective against viral infections like the common cold
Antibiotics are specifically designed to target and kill bacteria. They have no effect on viruses, which have a different structure and replication mechanism. Using antibiotics for viral illnesses like the common cold is ineffective and contributes to antibiotic resistance.

21. Mosquitoes and houseflies that spread pathogens from an infected person to a healthy person are known as _____.
(A) Hosts
(B) Parasites
(C) Microbes
(D) Vectors

Ans :

(D) Vectors
A vector is an organism that does not cause disease itself but which spreads infection by conveying pathogens from one host to another. Mosquitoes are well-known vectors for diseases like malaria and dengue.

22. A vaccine is to prevention as an antibiotic is to _____.
(A) Diagnosis (B) Treatment
(C) Immunity (D) Symptom

Ans :

(B) Treatment
This analogy relates a medical intervention to its purpose. Vaccines are administered to prevent a disease from occurring. Antibiotics are given as a treatment to cure an existing bacterial infection by killing the causative bacteria.

23. A person develops scurvy due to a lack of vitamin C in their diet. This is an example of a _____.
(A) Communicable disease
(B) Vector-borne disease
(C) Chronic disease
(D) Deficiency disease

Downloaded from www.pdf.tube

Ans :

(D) deficiency disease
Deficiency diseases are caused by the lack of essential nutrients, like vitamins or minerals, in the diet. Scurvy is a classic example, resulting specifically from insufficient vitamin C intake, and is a type of non-communicable disease.

24. Why has the prevalence of non-communicable diseases (NCDs) like diabetes and heart disease increased in India?
(A) It is due to lifestyle changes like diet and less exercise.
(B) It is primarily due to a recent rise in various viral infections.
(C) It is caused by a lack of effective vaccines for these conditions.
(D) It has been linked to a significant increase in mosquito populations.

Ans :

(A) It is due to lifestyle changes like diet and less exercise.
The rise in NCDs is strongly linked to modern lifestyle changes. Factors like unhealthy diets high in processed foods, a lack of physical activity, and increased stress contribute significantly to the development of these chronic conditions.

25. Diseases like cholera and typhoid are commonly spread through which medium?
(A) Air
(B) Insect bites
(C) Direct physical contact
(D) Contaminated water and food

Ans :

(D) Contaminated water and food
Cholera and typhoid are gastrointestinal infections caused by bacteria. These pathogens are primarily transmitted through the fecal-oral route, which occurs when a person ingests food or water that has been contaminated with the feces of an infected individual.

26. To prevent the spread of dengue fever, the most effective community measure would be to _____.
(A) Wear masks in crowded places
(B) Control mosquito breeding in and around homes
(C) Wash hands frequently with soap
(D) Get vaccinated against bacteria

Ans :

(B) control mosquito breeding in and around homes
Dengue fever is a viral disease transmitted by the bite of infected mosquitoes. Therefore, the most direct and effective way to prevent its spread is to eliminate the vector by removing stagnant water sources where mosquitoes lay their eggs.

27. The natural ability of our body to fight diseases is known as _____, which can be strengthened by _____.
(A) Immunity, vaccines
(B) Resistance, antibiotics
(C) Health, pathogens
(D) Hygiene, vectors

Ans :

(A) Immunity, vaccines
Immunity is the body's innate and acquired defense system against disease. Vaccines are a powerful tool to enhance this system; they introduce a harmless form of a pathogen to train the immune system to recognize and fight the actual disease.

28. How does a vaccine work?
(A) It directly kills any pathogens currently in the body.
(B) It provides the body with essential nutrients to fight infection.
(C) It creates a physical barrier to stop germs from entering the body.
(D) It trains the immune system to recognize and attack harmful germs.

Ans :

(D) It trains the immune system to recognize and attack harmful germs
A vaccine introduces a safe, modified version or a piece of a pathogen to the body. This exposure allows the immune system to learn to identify the pathogen and produce antibodies and memory cells, preparing it for a rapid and effective response to a future infection.

29. Why is it important to use antibiotics wisely and only when prescribed by a doctor?
(A) Because antibiotics are very expensive.
(B) Because antibiotics can cause viral infections.
(C) To prevent the development of antibiotic resistance.
(D) To ensure that everyone gets an equal share.

Ans :

NODIA

(C) To prevent the development of antibiotic resistance
The indiscriminate use of antibiotics exposes bacteria to the drugs, giving them opportunities to evolve and develop resistance. Using antibiotics only when necessary helps slow this process, preserving their effectiveness for treating serious bacterial infections in the future.

30. Which of the following is NOT listed as a good habit for maintaining a healthy lifestyle?
(A) Spending several hours on digital screens every day.
(B) Eating a balanced diet.
(C) Exercising regularly.
(D) Getting enough sleep.

Ans :

(A) Spending several hours on digital screens every day
While a balanced diet, regular exercise, and adequate sleep are crucial for good health, the text identifies spending too much time on digital screens as a habit that is not good for health and can lead to issues like obesity and sleep disorders.

31. What is the key difference between how antibiotics and vaccines protect us?
(A) Antibiotics prevent diseases from occurring; vaccines cure existing ones.
(B) Vaccines prevent disease by building immunity; antibiotics treat existing infections.
(C) Antibiotics work against viruses; vaccines work against bacteria.
(D) Vaccines are usually taken as pills; antibiotics are always injections.

Ans :

(B) Vaccines prevent disease by building immunity; antibiotics treat existing infections.
Their roles are distinct. Vaccines are used pro actively to prevent future infections by stimulating the immune system. Antibiotics are used reactively to treat a current bacterial infection by directly killing the harmful bacteria.

32. Malaria is a disease transmitted by mosquitoes. It is caused by which type of pathogen?
(A) Virus
(B) Bacteria
(C) Fungus
(D) Protozoa

Ans :

(D) Protozoa
Malaria is caused by a single-celled parasitic organism belonging to the Plasmodium group, which is classified as a protozoan. The mosquito acts as a vector, transmitting the protozoan from an infected person to a healthy one.

33. After a monsoon, a community sees a rise in water-borne diseases like cholera. Which of the following is the most likely cause?
(A) An increase in air pollution.
(B) A decrease in people's immunity.
(C) Contamination of drinking water sources.
(D) An increase in the number of stray animals.

Ans :

(C) Contamination of drinking water sources
Monsoon rains can lead to flooding and the contamination of wells, pipes, and other drinking water sources with sewage and other waste. This allows pathogens that cause diseases like cholera to spread easily through the water supply.

Download INDIA's Best Study app NODIA

34. Which lifestyle change would be most effective in preventing obesity and diabetes?
(A) Taking antibiotics regularly.
(B) Reducing screen time and increasing physical activity.
(C) Getting vaccinated against the flu.
(D) Avoiding contact with sick people.

Ans :

(B) Reducing screen time and increasing physical activity.
Obesity and Type 2 diabetes are strongly linked to lifestyle. A sedentary lifestyle, often associated with high screen time, and a lack of regular physical exercise are major risk factors for developing these non-communicable diseases.

35. What is a 'pathogen'?
(A) A disease-causing organism.
(B) Any type of microorganism.
(C) A medicine used to treat infections.
(D) A part of the immune system.

Ans :

(A) A disease-causing organism.
While many microorganisms exist, the specific term "pathogen" is used to describe those that have the potential to cause disease. This includes certain types of bacteria, viruses, fungi, and other microbes that can harm a host organism.

Click Here to Buy book on Amazon

36. Tuberculosis (TB) is a communicable disease caused by a bacterium that primarily affects which part of the body?
(A) The liver
(B) The intestine
(C) The skin
(D) The lungs

Ans :

(D) The lungs
Tuberculosis is a bacterial infection that most commonly attacks the lungs, causing symptoms like a persistent cough, fever, and fatigue. It is an airborne disease that spreads when an infected person coughs or sneezes.

37. Which of the following is an INCORRECT method of preventing communicable diseases?
(A) Washing hands frequently.
(B) Drinking boiled water.
(C) Sharing personal items like towels and handkerchiefs.
(D) Getting the recommended vaccinations.

Ans :

(C) Sharing personal items like towels and handkerchiefs
Personal items like towels can harbor pathogens and serve as a means of indirect contact transmission. Sharing them can easily spread infections from one person to another. Therefore, avoiding this practice is a key hygiene measure.

38. The development of antibiotic-resistant bacteria is a serious problem because it _____.
(A) Makes vaccines less effective
(B) Makes common infections harder to treat
(C) Causes more non-communicable diseases
(D) Increases the spread of viruses

Ans :

(B) Makes common infections harder to treat
When bacteria become resistant to an antibiotic, that drug can no longer effectively kill them. This means that infections caused by these resistant bacteria become difficult or sometimes impossible to treat, leading to prolonged illness and increased risk.

39. Ayurveda is to traditional medicine as vaccination is to _____.
(A) Modern preventative medicine
(B) Lifestyle disease
(C) Surgical procedure
(D) Nutritional supplement

Ans :

(A) modern preventative medicine
Ayurveda represents a holistic, traditional system of health and medicine. Vaccination, on the other hand, is a cornerstone of modern medicine, specifically focused on the prevention of infectious diseases by stimulating the immune system.

40. What is the primary purpose of a lightning conductor on a building?
(A) To attract lightning to the building for the purpose of scientific study.
(B) To generate a small amount of electricity from a potential lightning strike.
(C) To make the building look taller and much more prominent from a distance.
(D) To provide a safe path for electric charges from lightning to the ground.

Ans :

(D) To provide a safe path for electric charges from lightning to the ground
A lightning conductor is a safety device made of a metallic rod. It is installed on tall buildings to intercept a lightning strike and provide a low-resistance path for the immense electrical current to travel safely into the ground, preventing damage to the structure.

41. The sanitation campaign in Bhadrak, Odisha, which led to a reduction in diarrhoea, demonstrates that improving community hygiene is an effective way to control _____.
(A) Non-communicable diseases
(B) Genetic disorders
(C) Communicable diseases
(D) Lifestyle-related illnesses

Ans :

(C) Communicable diseases
The case study shows a direct link between improved sanitation (less open defecation) and a decrease in infectious diseases like diarrhoea. This highlights how public health measures that prevent the spread of pathogens are crucial for controlling communicable diseases.

NODIA

42. Why are vaccines considered preventive and not curative?
(A) They work by building the body's defenses before an infection occurs.
(B) They can only be given to healthy people.
(C) They are made from natural herbs and not chemicals.
(D) They only work on non-communicable diseases.

Ans :

(A) They work by building the body's defenses before an infection occurs
The primary function of a vaccine is to prepare the immune system for a future threat. It does not treat an active, ongoing illness. By introducing a harmless form of the pathogen, it allows the body to build immunity without having to experience the actual disease first.

43. What was the first antibiotic discovered by Alexander Fleming?
(A) Rotavirus
(B) Penicillin
(C) Tetanus
(D) Aspirin

Ans :

(B) Penicillin
In 1928, Alexander Fleming made a chance discovery when he noticed that a mould, Penicillium, was inhibiting the growth of bacteria on a petri dish. This observation led to the isolation of penicillin, the world's first antibiotic.

44. A healthy lifestyle includes eating a _____ diet and avoiding harmful substances like _____.
(A) High-sugar, water
(B) Low-protein, fruits
(C) Fatty, vegetables
(D) Balanced, tobacco

Ans :

(D) Balanced, tobacco
A balanced diet provides all the necessary nutrients for the body to function properly. At the same time, avoiding substances known to be harmful, such as tobacco, is a critical component of maintaining good health and preventing disease.

45. While both are serious health issues, how does a disease like chickenpox differ from cancer?
(A) Cancer can be prevented with a vaccine, but chickenpox cannot.
(B) Chickenpox affects the immune system, while cancer affects the skin.
(C) Chickenpox is a communicable virus; cancer is non-communicable.
(D) Cancer is a short-term illness, while chickenpox is a chronic one.

Ans :

(C) Chickenpox is a communicable virus; cancer is non-communicable.
This highlights the fundamental difference between the two types of diseases. Chickenpox is an infectious disease caused by a specific pathogen (virus) that can spread. Cancer is a non-communicable condition resulting from uncontrolled cell growth, not caused by a pathogen.

46. A doctor advises a patient with diabetes to make lifestyle changes like exercising and eating a balanced diet. Why is this advice given?
(A) To cure any bacterial infections the patient might have.
(B) Because lifestyle changes are key to managing non-communicable diseases.
(C) To build immunity against viral diseases like the flu.
(D) Because the patient's symptoms are caused by a pathogen.

Ans :

(B) Because lifestyle changes are key to managing non-communicable diseases
Non-communicable diseases like diabetes are heavily influenced by lifestyle factors. Healthy eating and regular physical activity can help manage blood sugar levels, improve the body's response to insulin, and prevent complications, forming a cornerstone of treatment.

NODIA

47. Which of the following pairs of diseases are both transmitted by mosquitoes?
(A) Malaria and Dengue
(B) Cholera and Tuberculosis
(C) Common cold and Measles
(D) Diabetes and Asthma

Ans :

(A) Malaria and Dengue
Both malaria and dengue are vector-borne diseases. They are spread to humans through the bites of infected mosquitoes, which act as carriers for the respective pathogens (a protozoan for malaria and a virus for dengue).

48. A person feels tired and has a fever. These are examples of _____.
(A) Signs of a disease
(B) Causes of a disease
(C) Treatments for a disease
(D) Symptoms of a disease

Ans :

(D) Symptoms of a disease

Symptoms are subjective feelings that indicate a potential illness, which are experienced and reported by the patient. Both tiredness (fatigue) and the feeling of having a fever are classic symptoms of many diseases.

49. A child who lives in a polluted city with poor air quality and is frequently exposed to dust and smoke is at a higher risk of developing which non-communicable disease?
(A) Typhoid
(B) Malaria
(C) Asthma
(D) Goitre

Ans :

(C) Asthma
Asthma is a chronic respiratory condition often triggered or worsened by environmental factors. Exposure to air pollutants like dust, smoke, and industrial fumes can irritate the airways and increase the risk of developing or exacerbating asthma.

50. The protection developed after exposure to a pathogen or a vaccine is known as _____.
(A) Innate immunity
(B) Acquired immunity
(C) Antibiotic resistance
(D) Pathogen strength

Ans :

(B) Acquired immunity
Acquired immunity is the body's ability to recognize and remember specific pathogens, allowing for a stronger and faster response upon future encounters. This type of immunity is not present from birth but is developed through infection or vaccination.

51. Which of the following is NOT a good practice for maintaining personal hygiene?
(A) Skipping meals, especially breakfast
(B) Washing hands with soap before eating.
(C) Brushing teeth twice a day.
(D) Taking a bath regularly.

Ans :

(A) Skipping meals, especially breakfast
Skipping meals is a dietary habit, not a hygiene practice. Moreover, it is listed as a habit that is not good for health. Personal hygiene involves practices like handwashing and bathing to keep the body clean and reduce the risk of infection.

52. What is the role of a school counsellor as described in the story of the student who moved to a new city?
(A) To prescribe medicine for headaches.
(B) To teach academic subjects like science.
(C) To check the student's physical health.
(D) To provide support for mental and social well-being.

Ans :

(D) To provide support for mental and social well-being
The student's issues were loneliness and stress, which are aspects of mental and social health. The school counsellor's role was to help him address these issues by supporting him in making friends and improving his overall well-being.

53. The Fit India Movement, mentioned on the bulletin board, primarily promotes what aspect of health?
(A) Taking more medicine.
(B) Reducing air pollution.
(C) Physical activity and a healthy lifestyle.
(D) Increasing screen time for educational purposes.

Ans :

(C) Physical activity and a healthy lifestyle
The Fit India Movement is a nationwide initiative aimed at encouraging people to include physical activities and sports in their everyday lives. It focuses on the physical well-being component of health by promoting an active lifestyle.

54. A doctor tells a patient that their high blood pressure is a non-communicable disease. What does this imply about the illness?
(A) The patient cannot pass it on to others through coughing or contact.
(B) The patient caught it from a family member recently.
(C) The disease will be cured quickly with a short course of antibiotics.
(D) It was caused by an insect bite.

Ans :

(A) The patient cannot pass it on to others through coughing or contact
The defining characteristic of a non-communicable disease is that it is not infectious. Therefore, a person with high blood pressure cannot transmit the condition to others, as it is related to lifestyle, genetics, or other internal factors.

Downloaded from www.pdf.tube

55. Bacteria is to Tuberculosis as Virus is to _____.
(A) Diabetes
(B) Chickenpox
(C) Goitre
(D) Asthma

Ans :

(B) Chickenpox
This analogy pairs a disease with its causative pathogen type. Tuberculosis is a well-known disease caused by bacteria. Similarly, Chickenpox is a common infectious disease that is caused by a virus (the varicella-zoster virus).

56. Consuming food and water contaminated with the excreta of an infected person is a common way to contract which of these diseases?
(A) Asthma
(B) Cancer
(C) Common cold
(D) Hepatitis A

Ans :

(D) Hepatitis A
Hepatitis A is a viral infection of the liver that spreads through the fecal-oral route. This occurs when a person ingests microscopic amounts of fecal matter from contaminated food or water, a primary mode of transmission for this disease.

57. Scurvy, anaemia, and goitre are all examples of what specific type of non-communicable disease?
(A) Lifestyle diseases
(B) Chronic diseases
(C) Deficiency diseases
(D) Genetic diseases

Ans :

(C) Deficiency diseases
These three conditions are caused by a lack of specific nutrients in the diet : scurvy by lack of vitamin C, anaemia often by lack of iron, and goitre by lack of iodine. They are therefore classified as deficiency diseases.

58. What is the logical sequence of events in the development of a thunderstorm?
(A) Warm air rises → Clouds form → Rain falls
(B) Rain falls → Clouds form → Warm air rises
(C) Clouds form → Rain falls → Warm air rises
(D) Rain falls → Warm air rises → Clouds form

Ans :

(A) Warm air rises → Clouds form → Rain falls
The process begins when warm, moist air rises. As it ascends, it cools, and the water vapor condenses to form clouds. Within the clouds, water droplets merge and become heavy enough to fall back to the ground as rain.

59. You are in an open field during a thunderstorm with lightning. What is the safest action to take?
(A) Stand under the tallest nearby tree for shelter from the rain.
(B) Crouch low in an open area, minimizing contact with the ground.
(C) Lie down completely flat on the ground to reduce your height.
(D) Hold a large metal umbrella over your head to try and stay dry.

Ans :

(B) Crouch low in an open area, minimizing contact with the ground.
During lightning, it is crucial to make yourself as small a target as possible and minimize your connection to the ground. Crouching low avoids being the tallest object and reduces the risk of a ground current passing through your body.

60. What is the main difference between the 'eye' of a cyclone and the surrounding region?
(A) The eye has strong winds and rain, while the surroundings are calm.
(B) The eye has the highest air pressure, while the surroundings have low.
(C) There is no difference; the entire cyclone is uniformly the same.
(D) The eye is a calm area, while the surroundings have strong winds.

Ans :

(D) The eye is a calm area, while the surroundings have strong winds.
The eye of a cyclone is the low-pressure center of the storm and is characterized by surprisingly calm and clear weather. This calm center is surrounded by the eye wall, which is where the most intense winds and heaviest rainfall of the cyclone are found.

61. According to Ayurveda, what are dinacharya and ritucharya?
(A) Types of medicinal herbs.
(B) Daily and seasonal routines for maintaining health.
(C) Forms of meditation and yoga.
(D) The balance of body, mind, and surroundings.

NODIA

Ans :

(B) Daily and seasonal routines for maintaining health
In Ayurveda, dinacharya refers to a daily routine and ritucharya refers to a seasonal routine. Following these prescribed routines for diet, exercise, and lifestyle is believed to help maintain the body's balance and promote overall health.

62. Why does wearing a mask in crowded places help prevent the spread of respiratory diseases?
(A) It effectively warms the air right before you breathe it into your lungs.
(B) It filters out all types of germs, including those found in food.
(C) It acts as a physical barrier, reducing the transmission of airborne droplets.
(D) It naturally strengthens the body's entire immune system over time.

Ans :

(C) It acts as a physical barrier, reducing the transmission of airborne droplets.
Respiratory diseases like the flu are spread through droplets expelled when an infected person coughs or sneezes. A mask covers the nose and mouth, acting as a barrier that can trap these droplets, reducing the chance of them being inhaled by others.

63. India is one of the world's largest producers of what crucial medical product for preventing infectious diseases?
(A) Vaccines
(B) Antibiotics
(C) Vitamins
(D) Surgical tools

Ans :

(A) Vaccines
The text highlights India's significant role in global health, stating that it is one of the world's largest vaccine producers. Indian companies manufacture vaccines on a massive scale and supply them to many countries around the world.

64. Penicillin is an _____ that kills _____.
(A) Vaccine, viruses
(B) Antiseptic, fungi
(C) Antibody, protozoa
(D) Antibiotic, bacteria

Ans :

(D) Antibiotic, bacteria
Penicillin was the first discovered antibiotic, a class of drugs specifically designed to combat bacterial infections. It works by interfering with the processes necessary for bacteria to build their cell walls, ultimately killing them.

65. Which of the following is NOT a component of the WHO definition of health?
(A) Physical well-being
(B) Mental well-being
(C) Financial stability
(D) Social well-being

Ans :

(C) Financial stability
The World Health Organization's definition of health is a state of complete physical, mental, and social well-being. While financial stability can influence health, it is not considered one of the core components of the definition itself.

66. Why are NCDs like diabetes and heart disease becoming more common in India?
(A) Because of changes in lifestyle, such as diet and reduced physical activity.
(B) Because of a decrease in hygiene and sanitation.
(C) Because of increased contact with infected animals.
(D) Because of a lack of access to clean drinking water.

Ans :

(A) Because of changes in lifestyle, such as diet and reduced physical activity.
The epidemiological shift in India shows a rise in NCDs directly linked to lifestyle transformations. Urbanization, more sedentary jobs, and a diet higher in processed foods are major contributing factors to this increase.

67. If a person is diagnosed with a bacterial infection like typhoid, what type of medicine would a doctor most likely prescribe?
(A) A vaccine
(B) An antibiotic
(C) An antiviral
(D) A painkiller only

Ans :

(B) An antibiotic
Typhoid is caused by the bacterium Salmonella Typhi. Since antibiotics are specifically designed to kill bacteria, they are the appropriate course of

Click Here to Buy book on Amazon

treatment for such an infection to eliminate the pathogen from the body.

68. Goitre, caused by a lack of iodine, falls into which two disease categories?
(A) Communicable and Chronic
(B) Vector-borne and Acute
(C) Viral and Bacterial
(D) Non-communicable and Deficiency

Ans :

(D) Non-communicable and Deficiency
Goitre is a non-communicable disease because it cannot be spread from person to person. Specifically, it is a deficiency disease, as it is caused by the insufficient intake of the essential mineral iodine.

69. The fact that you can receive a vaccine for polio as a child and be protected for many years demonstrates the concept of _____.
(A) Natural immunity
(B) Antibiotic resistance
(C) Acquired immunity and immunological memory
(D) Disease symptoms

Ans :

(C) acquired immunity and immunological memory
Vaccination works by creating acquired immunity. The immune system "remembers" the pathogen introduced by the vaccine. If exposed to the actual disease later in life, this immunological memory allows for a quick and effective response, preventing illness.

70. A group of people at a picnic all drink from the same contaminated water source and later fall ill with cholera. This is an example of what kind of disease transmission?
(A) Airborne transmission
(B) Water-borne transmission
(C) Vector-borne transmission
(D) Direct contact transmission

Ans :

(B) Water-borne transmission
Cholera is a classic example of a water-borne disease. The pathogen spreads when a water source is contaminated, and people become infected by ingesting that water. This scenario describes a common source outbreak typical for such diseases.

NODIA

71. Which scientist is credited with developing the Rotavirus vaccine, which protects children from diarrhoea?
(A) Dr. Maharaj Kishan Bhan
(B) Edward Jenner
(C) Dr. Kamal Ranadive
(D) Alexander Fleming

Ans :

(A) Dr. Maharaj Kishan Bhan
Dr. M. K. Bhan was an Indian doctor and scientist who played a pivotal role in the development of an affordable Rotavirus vaccine. This vaccine has been crucial in protecting children in India and globally from severe diarrhoea caused by the virus.

72. A key difference between a regular storm and a thunderstorm is that a thunderstorm includes _____.
(A) Only strong winds
(B) Only heavy rain
(C) Low air pressure
(D) Lightning and thunder

Ans :

(D) Lightning and thunder
While a storm is characterized by strong winds and precipitation, a thunderstorm is a specific type of storm that is also accompanied by the electrical phenomena of lightning and the resultant sound of thunder.

73. Lightning is caused by _____.
(A) The rapid and intense heating of air by direct rays from the sun.
(B) The loud sound of thunder causing vibrations in the air molecules.
(C) A sudden flow of electric charges within or between clouds and ground.
(D) The powerful collision of strong winds with each other in the sky.

Ans :

(C) A sudden flow of electric charges within or between clouds and ground.
Inside storm clouds, the movement of ice particles and water droplets causes a separation of positive and negative electric charges. Lightning is the massive electrostatic discharge that occurs when this charge buildup becomes large enough to break down the insulating property of air.

Download INDIA's Best Study app NODIA

74. Why are the walls at the base of a large dam made much broader than at the top?
(A) To make the dam look more aesthetically pleasing.
(B) To withstand the greater water pressure at the bottom.
(C) To provide a walkway for maintenance workers.
(D) To save on construction materials at the top.

Ans :

(B) To withstand the greater water pressure at the bottom
The pressure exerted by a liquid increases with depth. Therefore, the water pressure at the base of a dam is significantly higher than at the top. The base is built much thicker and broader to provide the necessary strength to withstand this immense force.

75. Pressure is defined as _____.
(A) Force per unit area
(B) The total weight of an object
(C) The speed of moving air
(D) The heat generated by friction

Ans :

(A) Force per unit area
Pressure is a measure of how concentrated a force is. It is calculated by dividing the force applied perpendicular to a surface by the area over which that force is distributed. A large force over a small area results in high pressure.

76. Which of the following statements about air pressure is correct?
(A) Air moves from a region of low pressure to a region of high pressure.
(B) High-speed winds are accompanied by an increase in air pressure.
(C) Air exerts pressure only downwards.
(D) Differences in air pressure cause winds to blow.

Ans :

(D) Differences in air pressure cause winds to blow
Wind is essentially the movement of air. This movement is driven by the tendency of air to flow from areas where the pressure is higher towards areas where the pressure is lower, in an attempt to equalize the pressure difference.

77. A sharp knife edge is to high pressure as a broad bag strap is to _____.
(A) High force
(B) Low weight
(C) Low pressure
(D) High speed

Ans :

(C) Low pressure
This analogy relates the size of the area of force application to the resulting pressure. A sharp edge concentrates force over a small area, creating high pressure. Conversely, a broad strap distributes the same force (weight) over a larger area, resulting in low pressure.

78. Why do we not get crushed by the immense pressure of the atmosphere?
(A) The atmosphere actually exerts very little pressure on the body.
(B) The pressure inside our bodies balances the pressure from outside.
(C) Our bones are simply strong enough to resist any external force.
(D) The force of gravity pushes upwards, cancelling out the pressure.

Ans :

(B) The pressure inside our bodies balances the pressure from outside.
The fluids and gases within our bodies exert an outward pressure that is equal to the inward pressure exerted by the surrounding atmosphere. These opposing forces cancel each other out, which is why we do not feel the significant weight of the air above us.

79. During a cyclone, the roof of a house with weak construction might be blown off. This happens because _____.
(A) High-speed wind over the roof creates a low-pressure area above it.
(B) The heavy rain makes the roof structure too heavy to stay in place.
(C) Lightning strikes the roof, causing it to be pushed directly upwards.
(D) The house begins to fill with water, pushing the roof off from below.

Ans :

(A) High-speed wind over the roof creates a low-pressure area above it.
According to Bernoulli's principle, fast-moving air has lower pressure. The high-speed wind over the roof creates a low-pressure zone, while the still air inside the house remains at a higher pressure.

Downloaded from www.pdf.tube

This pressure difference creates a net upward force that can lift the roof off.

80. Which government department in India is responsible for monitoring and issuing warnings for cyclones and thunderstorms?
(A) The Ministry of Health
(B) The Department of Biotechnology
(C) The National Disaster Response Force
(D) The India Meteorological Department (IMD)

Ans :

(D) The India Meteorological Department (IMD)
The India Meteorological Department (IMD) is the principal government agency responsible for meteorological observations, weather forecasting, and seismology. It plays a crucial role in monitoring severe weather events like cyclones and providing timely warnings to the public.

81. The sound produced by the rapid expansion of air heated by lightning is known as _____.
(A) A cyclone
(B) A storm
(C) Thunder
(D) Wind

Ans :

(C) Thunder
A lightning bolt is incredibly hot and it rapidly heats the channel of air it passes through. This sudden heating causes the air to expand explosively, creating a shockwave that we hear as the sound of thunder.

MATCHING TYPE QUESTIONS

82. Match the fundamental health concepts with their correct definitions.

	Column A		**Column B**
1	Health (WHO Definition)	A	An indication of disease that can be seen or measured, like a fever or rash.
2	Pathogen	B	A feeling of being unwell that a person experiences, such as pain or dizziness.
3	Symptom	C	A state of complete physical, mental, and social well-being, not just the absence of disease.
4	Sign	D	A disease-causing microorganism, such as a bacterium, virus, or fungus.

Options
(a) 1-A, 2-B, 3-D, 4-C
(b) 1-D, 2-C, 3-A, 4-B
(c) 1-C, 2-D, 3-B, 4-A
(d) 1-B, 2-A, 3-C, 4-D

Ans :

(c) 1-C, 2-D, 3-B, 4-A
The WHO defines health as complete well-being. A pathogen is a disease-causing germ. A symptom is what a patient feels, while a sign is an objective indicator that can be measured by a doctor.

83. Match the type of disease with its correct description or example.

	Column A		**Column B**
1	Communicable Disease	A	A disease like scurvy or anaemia, caused by the lack of a specific nutrient in the diet.
2	Non-communicable Disease	B	An illness caused by pathogens that spreads through insects like mosquitoes, such as Dengue fever.
3	Deficiency Disease	C	An illness like chickenpox or typhoid, caused by pathogens that can spread from person to person.
4	Vector-borne Disease	D	A condition like diabetes or asthma, which is linked to lifestyle and does not spread between people.

Options
(a) 1-C, 2-D, 3-A, 4-B
(b) 1-D, 2-A, 3-B, 4-C
(c) 1-A, 2-B, 3-C, 4-D
(d) 1-B, 2-C, 3-D, 4-A

Ans :

NODIA

(a) 1-C, 2-D, 3-A, 4-B
Communicable diseases are caused by pathogens and can spread. Non-communicable diseases are linked to lifestyle and do not spread. Deficiency diseases are caused by a lack of nutrients. Vector-borne diseases are transmitted by insects.

84. Match the method of disease prevention or treatment with its correct description.

	Column A		**Column B**
1	Vaccination	A	The body's natural ability to recognize and fight off harmful germs.
2	Antibiotic	B	A medicine that is effective only against bacterial infections and does not work on viruses.
3	Hygiene	C	A preventive measure that trains the immune system to fight a specific disease before infection occurs.
4	Immunity	D	Practices like washing hands with soap and keeping surroundings clean to prevent the spread of germs.

Options
(a) 1-B, 2-A, 3-C, 4-D
(b) 1-C, 2-B, 3-D, 4-A
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-A, 2-D, 3-B, 4-C

Ans :

(b) 1-C, 2-B, 3-D, 4-A
Vaccination trains the immune system to prevent disease. Antibiotics are medicines that kill bacteria. Hygiene involves keeping clean to avoid germs. Immunity is the body's natural ability to fight diseases.

85. Match the disease with its primary cause or mode of transmission.

	Column A		**Column B**
1	Diabetes	A	Caused by a protozoan pathogen that is transmitted to humans through a mosquito bite.
2	Common Cold	B	A non-communicable disease strongly linked to lifestyle factors like diet and lack of physical activity.
3	Malaria	C	A bacterial infection that primarily affects the lungs and spreads through the air.
4	Tuberculosis (TB)	D	Caused by a virus and commonly spreads through the air when an infected person coughs or sneezes.

Options
(a) 1-D, 2-C, 3-B, 4-A (b) 1-A, 2-B, 3-D, 4-C
(c) 1-C, 2-A, 3-B, 4-D (d) 1-B, 2-D, 3-A, 4-C

Ans :

(d) 1-B, 2-D, 3-A, 4-C
Diabetes is a non-communicable lifestyle disease. The common cold is a viral disease spread through the air. Malaria is caused by a protozoan spread by mosquitoes. Tuberculosis is a bacterial lung disease spread through the air.

86. Match the scientific term or pioneer with their correct contribution to health science.

	Column A		**Column B**
1	Edward Jenner	A	A condition where bacteria evolve and are no longer killed by medicines, often due to overuse.
2	Alexander Fleming	B	An organism, such as a mosquito or housefly, that carries and transmits pathogens.
3	Vector	C	The English doctor who developed the world's first vaccine by studying cowpox and smallpox.
4	Antibiotic Resistance	D	The bacteriologist who made the chance discovery of penicillin, the first antibiotic.

Click Here to Buy book on Amazon

Options
(a) 1-C, 2-D, 3-B, 4-A
(b) 1-B, 2-A, 3-D, 4-C
(c) 1-A, 2-C, 3-B, 4-D
(d) 1-D, 2-B, 3-A, 4-C

Ans :

(a) 1-C, 2-D, 3-B, 4-A
Edward Jenner developed the smallpox vaccine. Alexander Fleming discovered penicillin. A vector is an insect that spreads disease. Antibiotic resistance occurs when bacteria survive antibiotic treatment.

TRUE AND FALSE

87. According to the World Health Organization (WHO), being healthy is defined simply as the absence of any disease.

Ans :

False
The WHO defines health as a 'state of complete physical, mental, and social well-being, and not merely the absence of disease'.

88. Non-communicable diseases, such as diabetes, are caused by pathogens and spread easily from one person to another.

Ans :

False
Non-communicable diseases are not caused by pathogens and do not spread from person to person. They are typically linked to lifestyle, diet, and environment.

89. A symptom of an illness is something a person feels, like pain or tiredness, while a sign can be measured, like a fever.

Ans :

True
A symptom is what we feel (like pain), while a sign is something that can be seen or measured (like high body temperature).

90. Insects such as mosquitoes that carry diseases from an infected person to a healthy one are known as vectors.

Ans :

True
Some pathogens are spread by insects like mosquitoes and houseflies; these insects are called vectors.

91. Edward Jenner created the first vaccine after observing that people who contracted the mild disease cowpox became immune to the deadlier smallpox.

Ans :

True
Dr. Edward Jenner discovered that people who had cowpox did not get smallpox, a finding that led to the invention of the first vaccine.

Download INDIA's Best Study app NODIA

92. Vaccines are a curative treatment, meaning they are used to heal a person who is already sick with an infectious disease.

Ans :

False
Vaccines are preventive, not curative. They help protect against diseases before they happen but do not treat them once someone is already ill.

93. Antibiotics are powerful medicines that can be used to treat all infectious diseases, including those caused by viruses.

Ans :

False
Antibiotics are effective only against bacterial infections. They do not work against viruses or diseases caused by other pathogens like protozoa.

94. Taking antibiotics unnecessarily can contribute to the rise of antibiotic resistance, making bacterial infections harder to treat.

Ans :

True
The indiscriminate use of antibiotics has led to antibiotic resistance, where bacteria survive treatment, making infections harder to manage.

95. According to the text, today most deaths in India are caused by non-communicable diseases (NCDs).

Ans :

True

Downloaded from www.pdf.tube

Due to changes in lifestyle, NCDs like diabetes and heart disease have become more common, and today, most deaths in India are caused by NCDs.

96. The ancient Indian system of Ayurveda considers health to be a balance of body, mind, and surroundings.

Ans :

True

Ayurveda teaches that true health is achieved through a balance of body, mind, and surroundings, maintained by routines, proper diet, and exercise.

97. Deficiency diseases like scurvy and anaemia are classified as communicable because they can spread through contact.

Ans :

False

Deficiency diseases are caused by a lack of specific nutrients in the diet and are considered non-communicable.

98. Pathogens are disease-causing organisms that can include bacteria, viruses, fungi, and protozoa.

Ans :

True

Diseases can be caused by germs like bacteria, viruses, and fungi. These disease-causing organisms are called pathogens.

99. India is a major global supplier of vaccines, manufacturing them on a massive scale for many countries.

Ans :

True

India is one of the world's largest vaccine producers and supplies them to many countries, playing a key role in global health efforts.

100. To prevent antibiotic resistance, one must use antibiotics wisely and only when prescribed by a doctor.

Ans :

True

We must use antibiotics wisely only when prescribed by a doctor, in the correct dose, and for the right duration to prevent the rise of resistant bacteria.

101. According to the text, maintaining good health is solely about physical well-being.

Ans :

False

Health is a state of complete physical, mental, and social well-being. Feelings and relationships matter just as much as physical health.

VERY SHORT QUESTIONS

102. What is the definition of health according to the World Health Organization (WHO)?

Ans :

According to the WHO, health is a state of complete physical, mental, and social well-being, and not merely the absence of disease.

103. How do vaccines provide acquired immunity to the body against harmful germs?

Ans :

Vaccines train the immune system to recognize and attack harmful germs, providing acquired immunity, which is protection developed after exposure to a pathogen.

104. What are pathogens, and what are some examples of these organisms?

Ans :

Pathogens are disease-causing organisms. Examples include germs like bacteria, viruses, fungi, worms, or even single-celled protozoa that cause diseases.

105. What is the main difference between communicable and non-communicable diseases?

Ans :

Communicable diseases are caused by pathogens and can spread between people, while non-communicable diseases are not caused by pathogens and do not spread.

106. Why are antibiotics ineffective against diseases caused by viruses or protozoa?

Ans :

Antibiotics are ineffective against viruses or protozoa because they are specifically designed

NODIA

to target and kill bacteria, not other types of pathogens.

107. What is antibiotic resistance, and why is it a growing concern?

Ans :

Antibiotic resistance is when bacteria survive and multiply despite treatment with an antibiotic. It makes common infections much harder to treat.

108. What are the three main aspects of health as defined by WHO?

Ans :

The three main aspects of health as defined by the World Health Organization are complete physical, mental, and social well-being, not just disease absence.

109. Name two non-communicable diseases that have become more common in India.

Ans :

In recent years, non-communicable diseases like diabetes, heart disease, and cancer have become increasingly common throughout India due to lifestyle changes.

110. How did Edward Jenner discover the principle behind the first vaccine?

Ans :

Edward Jenner observed that milkmaids who had previously contracted the milder disease cowpox did not later get the deadly disease smallpox.

111. Define what a 'symptom' and a 'sign' of being unwell are.

Ans :

A symptom is something a person feels, like pain or tiredness, while a sign is something that can be seen or measured, like a fever.

112. What are vectors in the context of disease transmission? Give an example.

Ans :

Vectors are insects that spread pathogens from one person to another. Common examples include mosquitoes that transmit malaria and houseflies.

113. What are deficiency diseases? Provide one example.

Ans :

Deficiency diseases are non-communicable conditions caused by a lack of specific nutrients in the diet. An example is scurvy or anaemia.

114. What are the two main factors that our overall health depends on?

Ans :

Our health depends on many factors, but the two main categories mentioned are our lifestyle (how we live) and our environment (our surroundings).

115. Who was Dr. Kamal Ranadive and what was her major research focus?

Ans :

Dr. Kamal Ranadive was a pioneering Indian biomedical researcher who studied the links between hormones, viruses, and cancer to improve its treatment.

116. What is the role of the immune system in the human body?

Ans :

The human body has a special system called the immune system, which has the natural ability to fight against diseases and pathogens.

117. Why do you think the text refers to health as the "ultimate treasure"?

Ans :

Health is called the ultimate treasure because it includes physical, mental, and social well-being, allowing a person to live a productive and happy life.

118. How can spending too much time on a phone negatively affect a person's health?

Ans :

Spending excessive time on a phone can lead to loneliness, headaches, weight loss, and poor sleep, affecting both mental and physical well-being.

119. Why should you cover your mouth and nose when coughing or sneezing?

Ans :

Covering your mouth and nose when coughing or sneezing helps prevent the spread of pathogens through the air, protecting others from getting sick.

Download INDIA's Best Study app NODIA

Click Here to Buy book on Amazon

120. Why is it important for a community to have access to and use toilets?

Ans :

Using toilets and practicing good sanitation significantly reduces open defecation, which in turn lowers the spread of communicable diseases like diarrhoea and infections.

121. Why is a doctor's prescription necessary before taking antibiotics for an illness?

Ans :

A doctor's prescription is crucial to ensure antibiotics are used wisely and only for bacterial infections, preventing the development of antibiotic-resistant bacteria.

122. How does a balanced diet contribute to maintaining a healthy lifestyle?

Ans :

Eating a balanced diet with plenty of fruits, vegetables, and whole grains provides essential nutrients required for the body to function properly.

123. Why should one avoid sharing personal items like towels and handkerchiefs?

Ans :

Avoiding the sharing of personal items is a key precaution that helps prevent the indirect transmission of pathogens that cause communicable diseases.

124. Why might a person living in a polluted area fall sick more often?

Ans :

A polluted and unhygienic environment is often full of flies, mosquitoes, and other pathogens that can cause people to fall sick more often.

125. What is the risk of eating processed, fatty, or sugary foods?

Ans :

Consuming processed, fatty, or sugary foods is an unhealthy habit that can lead to non-communicable diseases like diabetes, heart disease, and obesity.

126. Explain how getting enough sleep helps maintain good health.

Ans :

Getting enough sleep is a vital part of a healthy lifestyle because it allows the body and mind to properly rest and recover.

127. How could changes in how people live contribute to the rise of NCDs?

Ans :

Lifestyle changes such as eating more processed food and getting less exercise are directly linked to the increase in non-communicable diseases in India.

128. Why is it a good practice to stay home when you are unwell?

Ans :

Staying home and resting when unwell helps your body recover faster and also minimises the risk of spreading the infectious disease to other people.

Download INDIA's Best Study app NODIA

129. Why are vaccines considered preventive and not curative medicine?

Ans :

Vaccines are preventive because they train the immune system to stop diseases before they happen, but they do not treat an illness once sick.

130. Why is it important to wash hands with soap and water frequently?

Ans :

Washing hands frequently with soap and water is a simple but important hygienic practice that effectively removes pathogens and prevents disease transmission.

131. How can living in a clean environment positively impact your health?

Ans :

A clean environment with clean air and water is important for health because it reduces exposure to pollutants that can cause problems like coughing.

NODIA

132. What is the function of the Air Quality Index (AQI)?

Ans :

The Air Quality Index (AQI) is a tool that helps us understand the level of air pollution by indicating how clean the air is.

133. Why is India considered a key player in global health efforts?

Ans :

India is one of the world's largest vaccine producers, manufacturing them on a massive scale and supplying them to many other countries globally.

134. Besides physical health, what other factors are important for overall well-being?

Ans :

Besides physical health, our feelings and relationships also matter; spending time with friends and family helps keep our minds healthy and happy.

135. Who was Dr. Maharaj Kishan Bhan and what was his contribution?

Ans :

Dr. Maharaj Kishan Bhan was an Indian scientist who played a key role in developing the Rotavirus vaccine, which protects children from diarrhoea.

136. What are chronic diseases? Give an example.

Ans :

Chronic diseases are conditions that often persist for a long time, typically more than three months. Examples include diabetes and asthma.

137. Why is it important to say 'NO' to harmful substances like tobacco?

Ans :

Saying 'NO' to harmful substances is crucial because things like tobacco can raise the risk of developing serious non-communicable diseases like cancer.

138. What was the ancient Indian method of variolation used for?

Ans :

Variegation was a traditional Indian method used long before modern vaccines to protect against smallpox by creating a mild infection to build immunity.

139. How does Alexander Fleming's discovery of penicillin illustrate a "chance discovery"?

Ans :

Fleming's discovery was by chance because he noticed that a mould on a discarded petri dish had accidentally contaminated it and stopped bacterial growth.

140. Why is it important for doctors to distinguish between signs and symptoms?

Ans :

Distinguishing between signs and symptoms is important because it helps doctors correctly diagnose the underlying cause of an illness and prescribe appropriate treatment.

141. Why do you think both a healthy diet and regular exercise are recommended?

Ans :

Both are recommended because a healthy diet provides necessary fuel and nutrients, while regular exercise keeps the body physically active and strong.

SHORT ANSWER QUESTIONS

142. Describe the primary ways in which communicable diseases are transmitted between individuals.

Ans :

Communicable diseases spread when pathogens move from an infected person to a healthy one. This can happen through the air when someone coughs or sneezes, through direct contact like shaking hands, or indirectly by sharing personal items. Contaminated food and water are also common sources of transmission for diseases like cholera and typhoid.

143. Explain the concept of 'immunity' and differentiate between natural and acquired immunity.

Ans :

Immunity is the body's natural ability to fight off diseases, managed by the immune system. Natural immunity is the inherent defense mechanism we are born with. Acquired immunity, however, is protection that our body develops after being exposed to a specific pathogen, either through a previous infection or, more safely, through vaccination.

144. What are the key components of a healthy lifestyle as outlined in the chapter?

Ans :

Downloaded from www.pdf.tube

A healthy lifestyle involves several key components for overall well-being. These include:

- Eating a balanced diet rich in fruits and vegetables while avoiding processed foods.
- Staying physically active through activities like playing, walking, or regular exercise.
- Getting enough sleep and managing stress through relaxation or yoga.
- Avoiding harmful substances like tobacco and alcohol.

145. Summarize the link between lifestyle factors and the increasing prevalence of non-communicable diseases (NCDs) like diabetes in India.

Ans :

The prevalence of NCDs like diabetes in India is rising due to significant lifestyle changes. Many people are eating more processed foods, getting less physical exercise, and living longer, all of which are risk factors. Specifically for diabetes, this is often coupled with unhealthy eating habits, lack of activity, and being overweight or obese.

146. Describe the process Alexander Fleming followed that led to the discovery of penicillin.

Ans :

In 1928, bacteriologist Alexander Fleming made a chance discovery while studying harmful bacteria. He observed that a mould on a discarded petri dish had prevented the bacteria around it from growing. Realizing the mould released a substance that killed bacteria, he investigated further, leading to the discovery of penicillin, the first modern antibiotic.

147. Why is maintaining a clean environment, including clean air and water, crucial for public health?

Ans :

The key reasons for maintaining a clean environment are:

- It reduces exposure to pollutants from vehicles and factories that can cause respiratory issues like coughing and asthma.
- Clean surroundings prevent the breeding of disease vectors like flies and mosquitoes, which transmit various infections.
- Access to clean water prevents water-borne diseases such as cholera, hepatitis A, and typhoid.

148. Explain how vaccines work to protect individuals from serious infectious diseases.

Ans :

Vaccines are a powerful preventive tool that works by training the body's immune system. They introduce a weakened, dead, or harmless part of a pathogen into the body. This prompts the immune system to learn how to recognize and attack the real germ without causing the actual disease, thus providing acquired immunity against future infections.

NODIA

149. What simple yet effective precautions can be taken to prevent the spread of common communicable diseases?

Ans :

The text highlights several key preventive measures against communicable diseases:

- Practicing good personal hygiene, including frequent handwashing with soap and water.
- Covering the mouth and nose while coughing or sneezing to prevent airborne transmission.
- Avoiding the sharing of personal items like towels, which can transmit pathogens indirectly.
- Ensuring food and drinking water are clean and uncontaminated.

150. What is meant by the term 'antibiotic resistance' and how does it develop?

Ans :

Antibiotic resistance is a phenomenon where bacteria evolve to survive and multiply even when treated with an antibiotic that was previously effective. This resistance often develops due to the indiscriminate or unnecessary use of antibiotics. When antibiotics are used, they kill susceptible bacteria, but any resistant ones survive, multiply, and can even transfer their resistance to other bacteria.

151. How does the Ayurvedic tradition approach the concept of true health?

Ans :

The Ayurvedic tradition teaches that true health is a harmonious balance between the body, mind, and one's surroundings. It emphasizes maintaining this balance through practices like following a daily routine (dinacharya) and a seasonal routine (ritucharya). Additionally, eating fresh food suited to one's body type, exercise, and a calm mind are considered essential.

152. A friend argues that being healthy just means not being sick. How would you explain the broader definition of health using the text?

Ans :

According to the WHO definition, health is much more than just not being sick. It is a state of complete physical, mental, and social well-being. This means a truly healthy person not only lacks disease but also feels good physically, maintains a positive mindset, and enjoys strong, healthy relationships with others in society.

153. Why is it incorrect to take antibiotics for a common cold or the flu? Explain based on the information provided.

Ans :

It is incorrect to take antibiotics for a common cold or flu for a critical reason. Antibiotics are specifically designed to work only against bacterial infections by targeting parts of bacterial cells. The common cold and flu are caused by viruses, not bacteria. Therefore, antibiotics will have no effect on these viral illnesses.

154. Imagine a new housing area with poor sanitation. Predict the likely health consequences for the residents.

Ans :

Based on the text, several health problems would likely emerge from poor sanitation.

- The area would become dirty and unhygienic, attracting flies and mosquitoes, leading to the spread of vector-borne diseases.
- Residents would be at high risk for communicable diseases like diarrhoea, cholera, and other infections due to contaminated water and surroundings.
- Overall, people living in such an area would likely fall sick more often than those in a clean environment.

155. How did Dr. Kamal Ranadive's research emphasize the importance of a healthy lifestyle in preventing cancer?

Ans :

Dr. Kamal Ranadive's research was significant because it highlighted how lifestyle and environmental factors can influence cancer risk. Her work showed that exposure to tobacco and pollution, as well as a person's diet, can increase the risk of developing cancer. This underscored the importance of living a healthy lifestyle as a key measure in cancer prevention.

156. Why must antibiotics be used wisely, and what are the recommended practices for their use?

Ans :

Antibiotics must be used wisely to combat the growing problem of antibiotic resistance, which makes infections harder to treat. Recommended practices include using them only when prescribed by a doctor, taking the correct dose as instructed, and completing the full course of treatment for the specified duration to ensure their continued effectiveness for everyone.

157. Describe the different ways in which pathogens can enter the human body.

Ans :

Pathogens can enter our bodies through various routes. Some of the most common pathways are:

- Through the air we breathe, especially when an infected person coughs or sneezes nearby.
- By consuming contaminated food or water, which is how diseases like typhoid are spread.
- Through direct physical contact with an infected person or indirect contact with their personal belongings.

158. Explain the role of 'vectors' in the transmission of diseases like malaria and dengue.

Ans :

Vectors are insects that carry and transmit pathogens from an infected individual to a healthy one. For example, mosquitoes are vectors for both malaria and dengue fever. A mosquito bites an infected person, ingests the pathogen (protozoa for malaria, a virus for dengue), and then transmits it to the next person it bites.

159. What is the difference between a sign and a symptom of a disease? Provide an example for each.

Ans :

The main difference lies in who can observe them. A symptom is a subjective feeling experienced by the patient, which cannot be directly measured by others. For example, feeling pain, tiredness, or dizziness are symptoms. A sign, however, is an objective indicator of disease that can be seen or measured, such as a fever, a rash, or high blood pressure.

Click Here to Buy book on Amazon

160. What are some harmful habits that one should avoid to maintain good health?

Ans :

The text lists several habits that are detrimental to good health. These include:

- Spending too much time on mobile phones or other digital screens.
- Regularly eating fast food and other unhealthy junk foods.
- Sleeping very late or not getting a sufficient amount of sleep.
- Skipping meals, with a special emphasis on not skipping breakfast.

161. Why do you think 'social well-being' is included as a core component of health?

Ans :

Social well-being is a core component because human health is not just about the body. The text indicates that feeling lonely or upset can make us feel unwell, even if we are physically fit. Therefore, spending time with friends and family, talking, and laughing are important for keeping our minds healthy and maintaining overall well-being.

162. What are some of the common symptoms associated with diseases spread through the air, like the common cold?

Ans :

Common symptoms of airborne diseases like influenza and the common cold primarily affect the respiratory system. These include nasal congestion and discharge, a sore throat, coughing, and fever. In addition to these respiratory symptoms, a person might also experience general body aches, indicating that the infection is affecting the entire body system.

163. If a person is diagnosed with a worm infection, what is the likely mode of transmission?

Ans :

Worm infections are typically caused by parasites that live inside the digestive system. The transmission of these worms usually occurs through the consumption of contaminated food or water. It can also happen through contact with contaminated soil, or by coming into contact with infected people or animals, which allows the worm eggs or larvae to be ingested.

164. Compare the causes of communicable diseases with those of non-communicable diseases.

Ans :

The causes of these two types of diseases are fundamentally different. Communicable diseases are caused by external infectious agents known as pathogens, which include bacteria, viruses, fungi, and protozoa that invade the body. In contrast, non-communicable diseases are not caused by germs but are typically linked to internal and lifestyle factors like diet, environment, and genetics.

NODIA

165. What lifestyle changes would you suggest to a person at risk of developing diabetes?

Ans :

For a person at risk of diabetes, several lifestyle changes are suggested.

- Adopt a balanced diet that includes plenty of fruits and vegetables, while avoiding processed and sugary foods.
- Engage in regular physical activity, such as playing sports, walking, or cycling to maintain a healthy weight.
- Ensure they get enough sleep and manage stress levels effectively through relaxation techniques.

166. How did the smallpox vaccine campaign, started in 1965, impact the global number of cases?

Ans :

The graph shows that before 1965, the number of countries reporting smallpox was consistently high, fluctuating between 50 and 80. After the vaccine campaign began in 1965, there was a dramatic and steady decline in reporting countries. This intensive global effort led to the complete eradication of smallpox by 1979, a major public health achievement.

167. What is the function of medicines called antibiotics in treating diseases?

Ans :

Antibiotics are medicines specifically prescribed by a doctor to treat infectious diseases. Their primary function is to kill the bacteria that have caused the illness. They are effective because they are designed to target and disrupt essential parts of bacterial cells that are different from the cells found in humans or other animals, thus eliminating the infection.

168. Why is it important for India to be a major producer of vaccines?

Ans :

India's role as one of the world's largest vaccine producers is vital for global health.

- It allows for the manufacture of vaccines on a massive scale, meeting both domestic needs and international demand.
- It enables India to supply vaccines to many other countries, supporting global health efforts.
- This capacity was crucial during events like the COVID-19 pandemic, demonstrating India's key role in public health.

169. A person has a fever, headache, and severe joint pain. What disease might they have, and what is the vector?

Ans :

Based on the symptoms provided in the table, the person likely has Dengue fever, which is also known as "Break bone fever" due to the severe muscle and joint pain it causes. The vector, or the insect responsible for transmitting this viral disease from one person to another, is the mosquito.

170. What did the community-led sanitation campaign in Odisha achieve?

Ans :

The community-led sanitation campaign in Odisha's Bhadrak district was highly successful. It encouraged more people to build and regularly use toilets, which led to a significant reduction in the practice of open defecation. The direct positive outcome of this initiative was improved child health, with fewer reported cases of diarrhoea and other related infections.

171. Explain why taking care of one's mental and social health is as important as physical health.

Ans :

The health is a complete state of well-being, not just physical. Even if one is physically fit and lives in a clean place, feelings of loneliness or being upset can lead to negative health outcomes. Therefore, maintaining strong social connections with friends and family is crucial for keeping the mind healthy and achieving true overall health.

LONG ANSWER QUESTIONS

172. Detail the scientific method Edward Jenner used, from observation to application, which led to the creation of the first vaccine.

Ans :

Edward Jenner's development of the smallpox vaccine followed a clear scientific process:

- **Observation** : He first observed that milkmaids who contracted the mild disease cowpox did not later get infected with the deadly smallpox virus, suggesting the two were related.
- **Hypothesis** : Based on this observation, he formed a hypothesis that the pus from cowpox blisters could be used to protect people from smallpox.
- **Experimentation** : He tested his hypothesis by injecting cowpox sap into a young boy. Later, when the boy was exposed to smallpox, he showed no signs of illness.
- **Application** : This successful experiment proved his theory, and the resulting application was mass vaccination, which eventually led to the complete worldwide eradication of smallpox.

173. Analyze the phenomenon of antibiotic resistance. Explain how it develops and spreads through a community, and what measures can be taken to control it.

Ans :

Antibiotic resistance is a major public health threat that develops through the following steps:

- **Development** : When antibiotics are used, they kill most bacteria, but a few microbes may naturally have or develop resistance and survive. These resistant bacteria then multiply and take over.
- **Spread** : Resistance spreads when these bacteria are transferred between humans, or from animals to humans through food products. This is often worsened by the overuse of antibiotics in both medicine and agriculture.
- **Control Measures** : To control this, we must use antibiotics wisely—only when prescribed by a doctor, in the correct dose, and for the full duration. This prevents the rise of resistant bacteria.

NODIA

174. Compare and contrast communicable and non-communicable diseases, providing examples, causes, and primary prevention strategies for each type.

Ans :

Communicable and non-communicable diseases differ significantly in their nature and prevention:

- **Causes and Examples** : Communicable diseases are caused by pathogens like viruses (e.g., flu) and bacteria (e.g., tuberculosis), while NCDs are linked to lifestyle, genetics, and environment (e.g., diabetes, asthma).
- **Transmission** : Communicable diseases spread from person to person through air, contact, or vectors. NCDs do not spread between individuals.
- **Prevention** : Preventing communicable diseases involves hygiene, sanitation, and vaccination. Preventing NCDs focuses on healthy lifestyle choices like a balanced diet, regular exercise, and avoiding tobacco.

175. Formulate a comprehensive public health campaign for a school to promote overall health and prevent diseases.

Ans :

A comprehensive school health campaign should include the following key messages:

- **Healthy Lifestyle** : Promote eating a balanced diet with fruits and vegetables, engaging in regular physical activity, and getting enough sleep. Discourage junk food and excessive screen time.
- **Hygiene and Sanitation** : Emphasize the importance of regular handwashing with soap, covering coughs and sneezes, and not sharing personal items to prevent the spread of germs.
- **Mental and Social Health** : Encourage students to talk about their feelings, spend time with friends and family, and manage stress through activities like yoga or meditation.
- **Disease Prevention** : Educate students on the importance of vaccination and avoiding harmful substances like tobacco to prevent both infectious and chronic diseases.

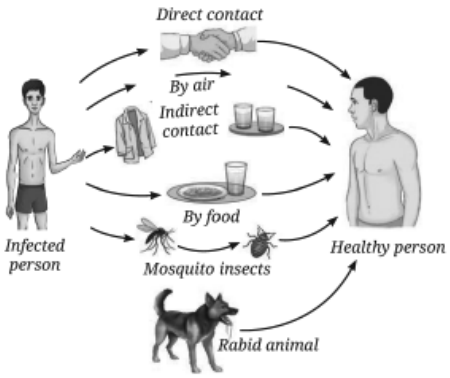
176. Explain how an individual's lifestyle, environment, and social connections are all interlinked in defining their overall health. Use examples from the chapter.

Ans :

The chapter shows that health is a multifaceted concept where different factors are interlinked:

- **Lifestyle and Environment** : A person's lifestyle choices, like diet and exercise, directly impact their health. This is influenced by their environment; for example, air pollution in a city can cause asthma despite a healthy lifestyle.
- **Social Connections** : A student who moves to a new city may feel lonely (social factor), leading to poor sleep and headaches (physical/mental factors), even if other lifestyle choices are good.
- **Holistic Approach** : True health requires balancing all three aspects. A clean environment, a healthy diet, and strong social bonds all work together to create a state of complete physical, mental, and social well-being.

177. Describe the different modes of transmission for communicable diseases as depicted in Figure , giving an example for each mode mentioned.



Ans :

Figure illustrates the various ways communicable diseases spread from an infected to a healthy person:

- **By Air** : Pathogens are released into the air when an infected person coughs or sneezes, which can be inhaled by others. An example is the common cold or influenza.
- **Direct Contact** : The disease can spread through physical touch, such as shaking hands with someone who is sick.
- **Indirect Contact** : Sharing personal items like clothes or utensils of an infected person allows pathogens to transfer to a healthy person.
- **By Food/Water** : Consuming food or water contaminated with pathogens can cause illnesses like cholera or typhoid.

Downloaded from www.pdf.tube

- **By Vectors/Animals** : Insects like mosquitoes can transmit diseases like malaria, and rabid animals can transmit rabies through bites.

178. Why are both vaccination and maintaining good hygiene considered critical pillars for preventing infectious diseases in a community?

Ans :

Both vaccination and hygiene are critical because they offer different but complementary layers of protection:

- **Vaccination (Internal Defense)** : Vaccines work inside the body to build specific, long-term immunity. They train the immune system to recognize and fight off particular pathogens, preventing serious illness before it starts.
- **Hygiene (External Barrier)** : Good hygiene practices, like handwashing and keeping surroundings clean, act as an external barrier. They reduce the overall presence of pathogens in the environment, lowering the chances of exposure and transmission for everyone.
- **Combined Effect** : Together, hygiene reduces exposure while vaccination ensures that if exposure does occur, the body is prepared to fight the infection effectively, protecting both individuals and the wider community.

179. A student is frequently sick with colds, while their friend, who lives in the same neighborhood, rarely gets sick. Analyze the possible reasons for this difference.

Ans :

The difference in sickness frequency, despite a similar environment, can be explained by several factors:

- **Immunity** : The student who is frequently sick may have a weaker natural immune system, making them more susceptible to common pathogens.
- **Lifestyle Habits** : The healthier friend might have better lifestyle habits, such as eating a more nutritious diet, getting more sleep, and exercising regularly, which all support a stronger immune response.
- **Hygiene Practices** : The friend who stays healthy might be more diligent with personal hygiene, such as washing hands more frequently, which reduces their exposure to germs.
- **Stress Levels** : Higher stress levels in the frequently sick student could also negatively impact their immune function, making them more vulnerable to infections.

180. Discuss the rise of non-communicable diseases (NCDs) in India, outlining the major causes and suggesting three key lifestyle changes to mitigate this trend.

Ans :

The rise of NCDs like diabetes and heart disease is a major health challenge in India.

- **Major Causes** : This trend is primarily driven by changes in how people live, including a shift towards eating more processed and unhealthy foods, a decrease in physical exercise, and increased longevity which raises the risk of age-related conditions.
- **Lifestyle Change 1 : Balanced Diet** : Adopt a diet rich in fruits, vegetables, and whole grains while strictly avoiding processed, fatty, and sugary foods and drinks to maintain a healthy weight.
- **Lifestyle Change 2 : Physical Activity** : Incorporate regular physical activity like walking, cycling, or playing sports to stay active and prevent obesity, a major risk factor for many NCDs.
- **Lifestyle Change 3 : Stress Management** : Practice yoga, meditation, or other relaxation techniques to manage stress, which can contribute to conditions like high blood pressure.

181. Explain why a person with symptoms of typhoid should seek medical attention and how the disease is typically transmitted and prevented.

Ans :

A person with typhoid symptoms must see a doctor for diagnosis and treatment.

- **Transmission** : Typhoid is a communicable disease caused by bacteria. It primarily spreads through the consumption of food or drinking water that has been contaminated with the faeces of an infected person.
- **Symptoms** : The key symptoms include sustained high fever, weakness, stomach pain, headache, and sometimes a rash, which require medical intervention.
- **Prevention** : Prevention relies heavily on public and personal hygiene. Key measures include maintaining good sanitary habits, ensuring the consumption of properly cooked

NODIA

food and boiled or treated drinking water, and getting vaccinated against the disease.

CASE BASED QUESTIONS

182. A student moves to a new city and feels lonely. He spends excessive time on his phone, stops making friends, and develops headaches and poor sleep. A doctor advises less screen time and counseling. This situation shows that health is not just about the absence of physical disease, but also includes mental and social well-being, as defined by the WHO.

Questions :

1. According to the WHO, what are the three components of complete health?
2. Besides physical symptoms like headaches, what other aspects of the boy's health were affected?
3. Why was the doctor's advice to get counseling just as important as the advice for less screen time?

Ans :

1. The three components are complete physical, mental, and social well-being.
2. His social health (feeling lonely, not making friends) and mental health were also negatively affected.
3. Counseling addresses the boy's social and mental well-being (loneliness), which was a root cause of his physical symptoms, demonstrating that all aspects of health are interconnected.

183. During winter, several students in a class get the flu, a communicable disease spread through the air when an infected person coughs or sneezes. Symptoms include fever, cough, and body ache. To prevent its spread, the school advises frequent handwashing, and for sick students to stay home to rest, which helps them recover and protects others.

Questions :

1. What is a communicable disease?
2. What are two preventive measures students can take to protect themselves from the flu?
3. Why is advising sick students to stay home a crucial step in controlling an outbreak of an airborne disease?

Ans :

1. A communicable disease is caused by pathogens and can spread from one person to another.
2. Students can wash hands frequently and cover their mouths and noses when coughing or sneezing.
3. Staying home prevents an infected person from spreading airborne pathogens via coughing and sneezing, thus minimizing the disease's transmission to healthy individuals.

184. A boy has a common cold with a sore throat and fever, which is caused by a virus. His parent wants to give him an antibiotic, but the doctor advises against it. The doctor explains that antibiotics are medicines that only kill bacteria, not viruses. Using antibiotics unnecessarily can lead to antibiotic resistance, making bacteria harder to kill in the future.

Questions :

1. Why are antibiotics ineffective against the common cold?
2. What is antibiotic resistance?
3. Explain the long-term danger to the community if many people use antibiotics for viral infections.

Ans :

1. Antibiotics work only against bacterial infections and are not effective against viruses, which cause the common cold.
2. Antibiotic resistance is when bacteria survive and multiply despite treatment with an antibiotic that used to kill them.
3. Widespread unnecessary use of antibiotics helps create more resistant bacteria, which can then spread in the community, making common bacterial infections harder to treat for everyone and increasing the risk of complications.

185. In a city, cases of dengue fever increase after the monsoon. Dengue is a viral disease transmitted by mosquitoes, which are insects that act as vectors. The health department starts a campaign to control mosquito breeding by advising people to remove stagnant water from coolers and pots, and to use mosquito nets and repellents to prevent bites.

Questions :

1. What is a vector in the context of disease transmission?

Click Here to Buy book on Amazon

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

2. What are two preventive measures one can take to avoid dengue?
3. Why do dengue cases likely increase after the monsoon season?

Ans :

1. A vector is an insect, like a mosquito or housefly, that spreads pathogens.
2. One can use mosquito nets and repellents and control mosquito breeding by not allowing water to stagnate.
3. The monsoon season leads to the collection of stagnant water in many places, which provides ideal breeding grounds for mosquitoes, the vectors of the dengue virus, thus increasing their population and the spread of the disease.

186. An uncle is diagnosed with diabetes, a non-communicable disease (NCD) that has become more common in India due to changes in lifestyle. His doctor advises him to make lifestyle changes, such as eating a balanced diet with less sugar, exercising regularly, and managing his weight. These changes can help manage the chronic disease and prevent complications.

Questions :

1. Are non-communicable diseases like diabetes caused by pathogens?
2. List two lifestyle changes suggested to help manage diabetes.
3. Why are NCDs like diabetes becoming more common in India today?

Ans :

1. No, non-communicable diseases are not caused by pathogens and do not spread from one person to another.
2. The suggested changes include eating a balanced diet and exercising regularly.
3. NCDs are becoming more common because of changes in how people live, such as eating more processed food, getting less exercise, and living longer lives.

187. A child receives a measles vaccine at a health clinic. The nurse explains that the vaccine contains a weakened or harmless part of the measles virus. This will train the child's immune system to recognize and fight the real virus in the future, providing acquired immunity. This preventive measure helps protect the child from getting a serious infection later.

Questions :

1. What is the natural ability of our body to fight diseases called?
2. How does a vaccine help the body fight a disease like measles?
3. The vaccines are "preventive, not curative." What does this mean?

Ans :

1. The body's natural ability to fight diseases is known as immunity.
2. A vaccine trains the immune system to recognize and attack harmful germs, like the measles virus, without causing the disease itself.
3. It means that vaccines are given to help prevent a person from getting sick in the first place, but they do not treat or cure the disease once someone is already ill.

188. After a flood, a village experiences an outbreak of cholera, a disease caused by bacteria that spreads through contaminated water and food. The main symptoms are severe diarrhea and vomiting. Health workers advise residents to drink only boiled water and maintain good personal hygiene to stop the spread of this communicable disease and prevent further cases in the community.

Questions :

1. How does the cholera-causing pathogen spread from one person to another?
2. What are two key preventive measures advised to control the cholera outbreak?
3. Why is boiling drinking water an effective method to prevent diseases like cholera and typhoid?

Ans :

1. Cholera spreads through the consumption of contaminated food or drinking water.
2. The two key measures are drinking boiled water and maintaining good personal and sanitary hygiene.
3. Boiling water kills the harmful pathogens, like bacteria and viruses, that cause water-borne diseases, making the water safe to drink.

189. A patient tells her doctor she has been feeling very tired and has a headache. These are her symptoms. The doctor then uses a thermometer and finds her temperature is high, which is a sign of a fever. The doctor explains that understanding both what the patient feels and what can be measured helps in diagnosing what might be making her unwell.

NODIA

Questions :

1. What is the difference between a sign and a symptom of being unwell?
2. In this case, which is the sign and which is the symptom?
3. Why is it important for a doctor to know both the signs and symptoms to diagnose an illness?

Ans :

1. A symptom is what a person feels (like pain or tiredness), while a sign is something that can be seen or measured (like a fever or rash).
2. Tiredness and headache are the symptoms, while the high body temperature (fever) is the sign.
3. Combining the patient's subjective feelings (symptoms) with objective measurements (signs) gives the doctor a more complete picture to understand what might be causing the illness.

Download INDIA's Best Study app NODIA

190. In a district in Odisha, a community-led sanitation campaign helped more families build and use toilets. This effort significantly reduced open defecation. As a result, the health of children in the area improved, with fewer cases of diarrhea and other infections. This case study demonstrates how keeping the environment clean is crucial for preventing the spread of communicable diseases.

Questions:

1. What was the main goal of the community campaign in Odisha?
2. What positive health impact did this campaign have on the children in the district?
3. How does improving sanitation and reducing open defecation help prevent the spread of diseases?

Ans :

1. The main goal was to help more people build and use toilets to reduce open defecation.
2. It led to improved child health, with fewer cases of diarrhea and infections.
3. Improving sanitation prevents pathogens from human waste from contaminating food and water sources, which is a major way diseases like cholera, typhoid, and worm infections spread.

191. In 1928, scientist Alexander Fleming noticed that a mould growing on a petri dish had stopped the bacteria around it from growing. He realized the mould was releasing a substance that killed the bacteria. This accidental observation led to the discovery of penicillin, the first antibiotic, which has since saved millions of lives by treating bacterial infections.

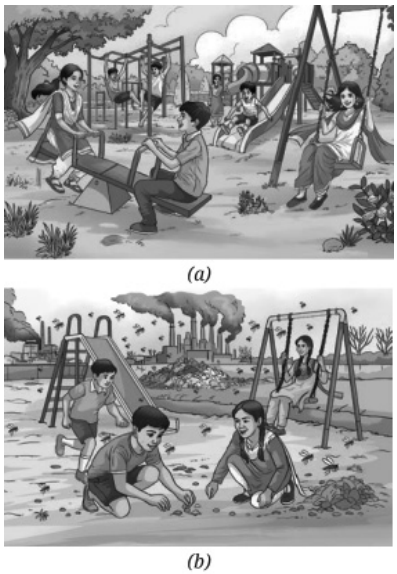
Questions:

1. Who discovered the first antibiotic, penicillin?
2. What did Fleming observe that led to his discovery?
3. Fleming's discovery was accidental. What does this tell you about the nature of scientific discovery?

Ans :

1. Alexander Fleming discovered penicillin.
2. He observed that a mould on a petri dish was preventing the growth of harmful bacteria around it.
3. This shows that scientific discovery is not always planned. It often relies on careful observation, curiosity, and the ability to recognize the significance of unexpected results.

192. A picture in a textbook shows two playgrounds. One is clean, well-maintained, and surrounded by greenery. The other is dirty, with garbage lying around, and located near smoking factories. Most children would choose the clean playground, as a polluted and unhygienic environment can lead to more frequent illnesses and health problems like coughing or asthma from air pollution.



Two different playgrounds

Downloaded from www.pdf.tube

Questions:

1. What makes the second playground an unhygienic environment?
2. What health problems can air pollution from vehicles and factories cause?
3. Besides preventing physical illness, how does a clean and pleasant environment contribute to overall health as defined by WHO?

Ans :

1. The second playground is polluted, dirty, unhygienic, and full of flies and mosquitoes.
2. Air pollution can cause problems like coughing or asthma.
3. A clean environment also contributes to mental and social well-being by helping people feel better and providing a safe space for social activities like playing with friends.

193. In the late 1700s, English doctor Edward Jenner observed that milkmaids who got a mild disease called cowpox did not get the deadly disease smallpox. He hypothesized that exposure to cowpox protected them. He tested this by using material from a cowpox sore to create a mild infection in a boy, who was then protected from smallpox, leading to the world's first vaccine.

Questions:

1. What key observation did Edward Jenner make about milkmaids?
2. How did Jenner's work lead to the invention of the first vaccine?
3. Jenner followed a scientific process. What was his hypothesis, and how did he test it?

Ans :

1. He observed that milkmaids who had been infected with cowpox did not get smallpox.
2. His discovery showed that exposure to a milder, related disease could provide protection (immunity) against a more deadly one, which is the basic principle of vaccination.
3. His hypothesis was that material from cowpox blisters could protect people from smallpox. He tested this by injecting cowpox material into a boy and later exposing him to smallpox, which the boy did not catch.

194. In a health class, students learn about non-communicable diseases that are caused by a lack of specific nutrients in the diet. The teacher gives examples like scurvy, caused by a lack of Vitamin C, and goitre, caused by a lack of iodine. She explains that eating a balanced diet with a variety of foods is the best way to prevent these deficiency diseases.

Questions:

1. What are diseases caused by a lack of specific nutrients in the diet called?
2. Is a disease like goitre a communicable or non-communicable disease? Explain why.
3. Why is eating a "balanced diet" an effective way to prevent deficiency diseases?

Ans :

1. They are called deficiency diseases.
2. Goitre is a non-communicable disease because it is caused by a nutritional deficiency, not by a pathogen, and therefore cannot be spread from person to person.
3. A balanced diet includes a variety of foods like fruits, vegetables, and whole grains, which ensures the body gets all the different nutrients it needs, thus preventing any specific deficiency.

195. A student with chickenpox, a viral disease, leaves his towel in the school locker room. Another student uses the same towel later that day. A few days later, the second student also develops chickenpox. This is an example of a communicable disease spreading through indirect contact, by sharing personal items that have been contaminated with pathogens from an infected person.

Questions:

1. Is chickenpox caused by a bacterium or a virus?
2. How did the disease spread from the first student to the second in this scenario?
3. Besides avoiding the sharing of towels, what is another important preventive measure for chickenpox mentioned in the chapter?

Ans :

1. Chickenpox is caused by a virus.
2. The disease spread through indirect contact by sharing a personal item (a towel) belonging to an infected person.
3. Another important preventive measure is vaccination.

196. A health campaign poster lists several habits to maintain good health. These include eating a balanced diet, avoiding junk food, getting enough sleep, limiting screen time, and exercising regularly. The poster emphasizes that these personal lifestyle choices are crucial for preventing

NODIA

many non-communicable diseases like obesity, diabetes, and heart problems, which are major health challenges today.

Questions:

1. List three good habits mentioned that promote a healthy lifestyle.
2. How does limiting screen time contribute to better health, according to the chapter?
3. Why is it important for individuals to adopt healthy habits to control the rise of non-communicable diseases in a country?

Ans :

1. Three good habits are eating a healthy and balanced diet, exercising regularly, and getting enough sleep.
2. Excessive screen time in children is linked to a rise in obesity, sleep disorders, anxiety, and dry eye disease, so limiting it helps prevent these issues.
3. Since many NCDs are linked to lifestyle choices like diet and exercise, individual adoption of healthy habits is a primary way to prevent these diseases, which are now a major cause of death in India.

****

Click Here to Buy book on Amazon

CHAPTER 4

ELECTRICITY : MAGNETIC AND HEATING EFFECTS

SUMMARY

1. THE MAGNETIC EFFECT OF ELECTRIC CURRENT

1.1 The Link Between Electricity and Magnetism

When an electric current flows through a wire, it produces a magnetic field around it. This is known as the magnetic effect of electric current.
This effect can be observed when a magnetic compass needle deflects from its normal position when brought near a current-carrying wire. The magnetic effect disappears when the current stops flowing. This fundamental connection between electricity and magnetism was discovered by scientist Hans Christian Oersted in 1820.

1.2 Electromagnets : Temporary Magnets

A current-carrying coil that behaves like a magnet is called an electromagnet. It can be made by tightly wrapping an insulated wire around an iron core (like a nail).The coil acts as a magnet only when electric current is flowing through it. When the current is turned off, it loses its magnetism.

Coil of wire connected with a cell

1.3 Strength and Polarity of Electromagnets

1. Strength : The strength of an electromagnet can be changed in three main ways:
   (i) Inserting an iron core inside the coil makes it much stronger.
   (ii) Increasing the amount of current (e.g., by using more cells in a battery) creates a stronger magnetic field.
   (iii) Increasing the number of turns of the wire in the coil also makes the magnet stronger.
2. Polarity : Just like a permanent magnet, an electromagnet has a North and a South pole. The poles can be reversed by simply changing the direction of the electric current.

1.4 Applications of Electromagnets

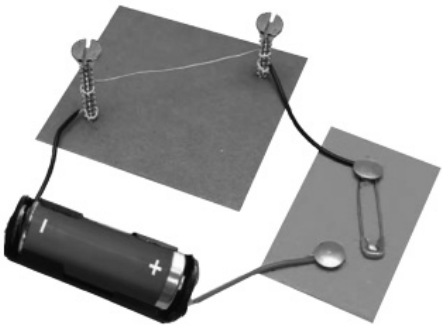
1. The magnetic effect of current is used in many common devices like electric bells, motors, fans, and loudspeakers.
2. Lifting Electromagnets : Very strong electromagnets are attached to cranes in factories and scrap yards. They are used to lift, move, and sort heavy iron and steel objects by switching the current on and off.

2. THE HEATING EFFECT OF ELECTRIC CURRENT

2.1 How Current Produces Heat

When an electric current passes through a conductor, the conductor gets heated. This is known as the heating effect of electric current. This happens because all conductors offer some resistance to the flow of current. This resistance converts some of the electrical energy into heat energy.
Materials like nichrome wire have high resistance and are therefore used specifically for their heating properties.

Downloaded from www.pdf.tube



Heating effect in a wire

2.2 Factors Affecting the Heat Produced

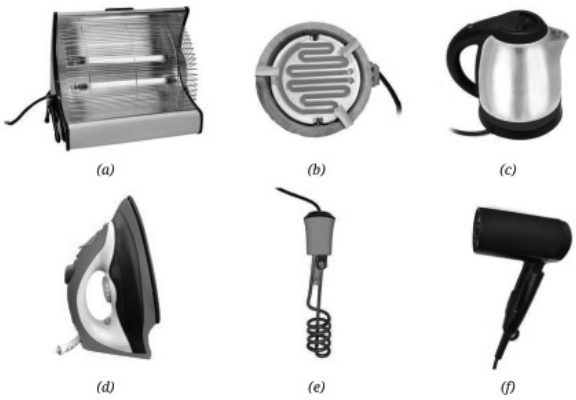
The amount of heat generated in a wire depends on several factors:

1. The amount of electric current flowing through it (more current generates more heat).
2. The material, thickness, and length of the wire.
3. The duration for which the current flows.

Download INDIA's Best Study app NODIA

2.3 Applications of the Heating Effect

1. This principle is used in many household appliances such as electric irons, room heaters, water heaters, electric stoves, and hair dryers.



Simple household electric heating appliances (a) Room heater; (b) Electric stove; (c) Electric kettle; (d) Electric iron; (e) Water heating immersion coil; or (f) Hair dryer

2. These devices contain a special coil of wire called a heating element that is designed to get very hot when current passes through it.
3. This effect is also used in industrial applications, such as in electric furnaces for melting and recycling steel.

NODIA

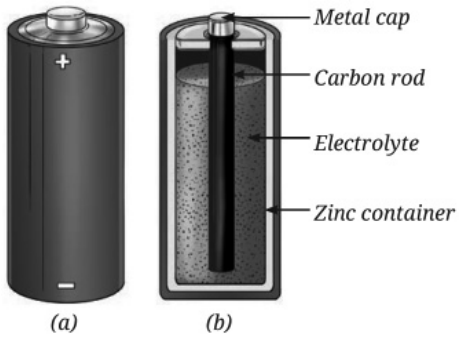
3. HOW BATTERIES GENERATE ELECTRICITY

3.1 The Basic Principle

A cell or a battery is a device that generates electric current through chemical reactions that take place inside it. A typical simple cell, like a Voltaic cell, consists of two different metal plates called electrodes and a liquid or paste called an electrolyte. When the chemicals in the electrolyte are used up, the cell stops working and is considered 'dead'.

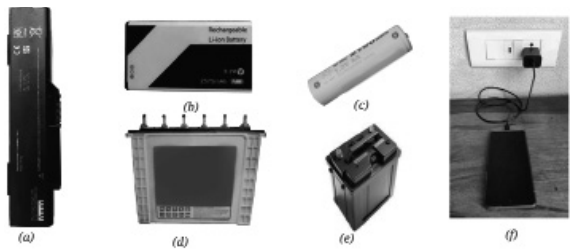
3.2 Types of Cells and Batteries

1. Dry Cells : These are the common single-use cells used in devices like TV remotes and toys. They are called 'dry' because their electrolyte is a moist paste, not a liquid. Once used up, they must be disposed of.



(a) Dry cell; (b) Its internal structure

2. Rechargeable Batteries : These batteries can be recharged and reused many times, which saves money and reduces waste. They are used in mobile phones, lap tops, and electric vehicles.



Typical rechargeable batteries used in (a) Laptops; (b) Mobile phones; (c) Camera; (d) Inverter; (e) Vehicles; (f) Charging a mobile phone

3. Lithium-ion (Li-ion) batteries are the most common type of rechargeable battery today.
4. Even rechargeable batteries wear out after being charged and used many times.

3.3 Battery Life and Disposal

1. When a battery stops working, it can still contain harmful chemicals like lead and acids.
2. These batteries should not be thrown in regular garbage. They should be disposed of properly at special 'e-waste' recycling facilities to protect the environment.

NCERT EXERCISE

1. Fill in the blanks:
(i) The solution used in a Voltaic cell is called _____.
(ii) A current carrying coil behaves like a _____.

Ans :

(i) The solution used in a Voltaic cell is called an electrolyte.
(ii) A current carrying coil behaves like an electromagnet.

2. Choose the correct option:
(i) Dry cells are less portable compared to Voltaic cells. (True/False)
(ii) A coil becomes an electromagnet only when electric current flows through it. (True/False)
(iii) An electromagnet, using a single cell, attracts more iron paper clips than the same electromagnet with a battery of 2 cells. (True/False)

Ans :

(i) False. Dry cells are designed to be convenient and portable for everyday use, unlike Voltaic cells which use a liquid electrolyte.
(ii) True. An electromagnet's magnetic effect is produced by the flow of electric current; when the current stops, the magnetic effect disappears.
(iii) False. A battery with more cells provides a larger current, which creates a stronger magnetic field capable of attracting more paper clips.

3. An electric current flows through a nichrome wire for a short time.
(i) The wire becomes warm.
(ii) A magnetic compass placed below the wire is deflected.
Choose the correct option:
(a) Only (i) is correct
(b) Only (ii) is correct
(c) Both (i)and (ii) are correct
(d) Both (i)and (ii) are not correct

Ans :

(c) Both (i) and (ii) are correct.
When an electric current passes through a conductor like a nichrome wire, it produces both a heating effect (the wire gets warm) and a magnetic effect (it deflects a compass needle).

4. Match the items in Column A with those in Column B.

	Column A		**Column B**
(i)	Voltaic cell	(a)	Generates electricity
(ii)	Electric iron	(b)	Best suited for electric heater
(iii)	Nichrome wire	(c)	Works on magnetic effect of electric current
(iv)	Electromagnet	(d)	Works on heating effect of electric current

Ans :

(i) Voltaic cell → (a) Generates electricity
(ii) Electric iron → (d) Works on heating effect of electric current
(iii) Nichrome wire → (b) Best suited for electric heater
(iv) Electromagnet → (c) Works on magnetic effect of electric current

5. Nichrome wire is commonly used in electrical heating devices because it
(i) Is a good conductor of electricity.
(ii) Generates more heat for a given current.
(iii) Is cheaper than copper.
(iv) Is an insulator of electricity.

Ans :

(ii) Generates more heat for a given current.
Nichrome wire has a higher resistance compared to other conductors like copper. This higher resistance causes more electrical energy to be converted into heat, making it ideal for heating elements.

6. Electric heating devices (like an electric heater or a stove) are often considered more convenient than traditional heating methods (like burning

Click Here to Buy book on Amazon

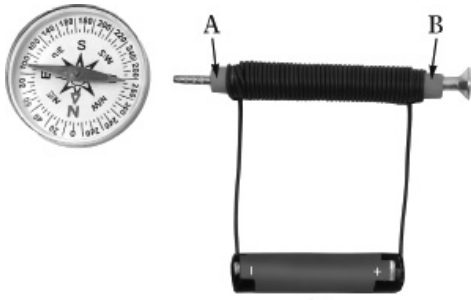
firewood or charcoal). Give reason(s) to support this statement considering societal impact.

Ans :

Electric heating devices are considered more convenient for several societal reasons:

1. Health and Environment : They do not produce smoke or harmful gases at the point of use, unlike burning firewood or charcoal. This reduces indoor and outdoor air pollution, leading to better public health.
2. Ease of Use : Electric devices can be turned on and off instantly with a switch, offering better control and convenience compared to the effort of starting and managing a fire.
3. Safety : While all heating methods have risks, electric heaters eliminate the hazard of open flames inside a home, reducing the risk of accidental fires.

7. Look at the figure. If the compass placed near the coil deflects:

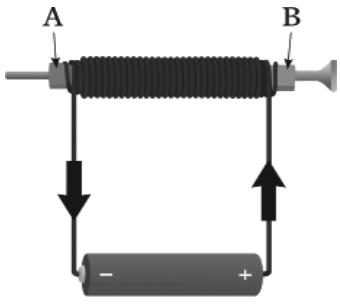


Compass needle near End A

(i) Draw an arrow on the diagram to show the path of the electric current.
(ii) Explain why the compass needle moves when current flows.
(iii) Predict what would happen to the deflection if you reverse the battery terminals.

Ans :

(i)



(ii) The compass needle moves because an electric current flowing through the coil creates a magnetic field around it. The compass needle is a small magnet, and it deflects when it comes under the influence of this magnetic field.

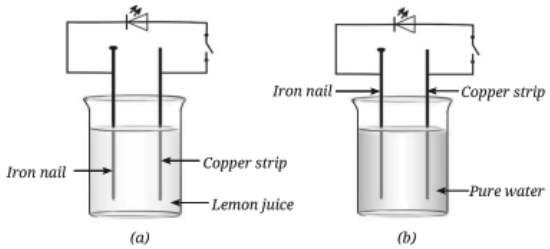
(iii) If the battery terminals are reversed, the direction of the electric current through the coil will also reverse. This will reverse the polarity (North and South poles) of the electromagnet. As a result, the compass needle will be deflected in the opposite direction.

8. Suppose Sumana forgets to move the switch of her lifting electromagnet model to OFF position (in introduction story). After some time, the iron nail no longer picks up the iron paper clips, but the wire wrapped around the iron nail is still warm. Why did the lifting electromagnet stop lifting the clips? Give possible reasons.

Ans :

The lifting electromagnet stopped lifting the clips because the electric current required to create a strong magnetic field stopped flowing. The most likely reason is that the battery has been used up or become 'dead'. Leaving the circuit on continuously drains the chemical energy of the battery quickly. The wire is still warm due to the heating effect of the small, residual current that may still be flowing, which is not strong enough to produce a significant magnetic effect.

9. In figure in which case the LED will glow when the switch is closed?



Ans :

The LED will glow only in case (a). To generate electricity, a Voltaic cell requires two different metal electrodes (copper and iron) and an electrolyte. Lemon juice is an acidic solution that acts as an electrolyte. Pure water is a poor conductor of electricity and cannot function effectively as an electrolyte.

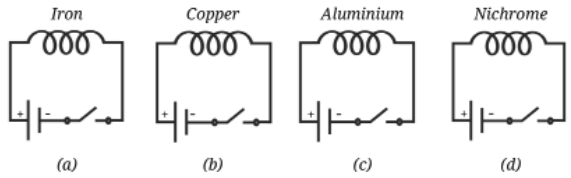
NODIA

10. Neha keeps the coil exactly the same as in Activity 4.4 but slides the iron nail out, leaving only the coiled wire. Will the coil still deflect the compass? If yes, will the deflection be more or less than before?

Ans :

Yes, the coil will still deflect the compass because a current-carrying coil behaves as an electromagnet even without an iron core. However, the deflection will be less than before. An iron core is used in electromagnets to make them stronger; without it, the magnetic field produced by the coil will be weaker.

11. We have four coils, of similar shape and size, made up from iron, copper, aluminium, and nichrome as shown in Figure



When current is passed through the coils, compass needles placed near the coils will show deflection.
(i) Only in circuit (a)
(ii) Only in circuits (a) and (b)
(iii) Only in circuits (a), (b), and (c)
(iv) In all four circuits

Ans :

(iv) In all four circuits.
The magnetic effect of electric current is produced whenever current flows through any conductor. Iron, copper, aluminium, and nichrome are all electrical conductors. Therefore, current will flow in all four circuits when the switch is closed, and each coil will produce a magnetic field that deflects a compass needle.

MULTIPLE CHOICE QUESTION

12. Who was the scientist that first discovered the link between electricity and magnetism by observing a compass needle deflect near a current-carrying wire?
(A) Hans Christian Oersted
(B) Alessandro Volta
(C) Luigi Galvani
(D) Alexander Fleming

Ans :

(A) Hans Christian Oersted
In 1820, Hans Christian Oersted observed that a compass needle moved whenever an electrical circuit nearby was closed or opened. This accidental discovery was the first to demonstrate that an electric current produces a magnetic field, linking the two phenomena.

13. What is the phenomenon where a conductor gets warm when an electric current flows through it called?
(A) The magnetic effect of electric current.
(B) The chemical effect of electric current.
(C) The conductive effect of electric current.
(D) The heating effect of electric current.

Ans :

(D) The heating effect of electric current.
When electric current passes through a conductor, it encounters resistance. This resistance causes some of the electrical energy to be converted into heat energy, warming the conductor. This process is known as the heating effect of electric current.

14. Why does a current-carrying wire cause a magnetic compass needle to deflect?
(A) The wire produces heat which moves the needle.
(B) The wire becomes statically charged and attracts the needle.
(C) The wire generates a magnetic field that interacts with the compass needle.
(D) The wire vibrates, causing the compass to shake.

Ans :

(C) The wire generates a magnetic field that interacts with the compass needle.
An electric current flowing through a wire creates a magnetic field in the space around it. The compass needle, being a small magnet itself, aligns with this field, causing it to deflect from its normal north-south orientation.

15. Why is an iron nail or core typically placed inside the coil of an electromagnet?
(A) To make the electromagnet weaker.
(B) To make the electromagnet stronger.
(C) To prevent the coil from getting hot.
(D) To allow the current to flow more easily.

Ans :

(B) To make the electromagnet stronger.

Downloaded from www.pdf.tube

An iron core significantly enhances the magnetic field produced by a current-carrying coil. The iron becomes strongly magnetized by the coil's field, and its own magnetic field adds to the coil's, resulting in a much more powerful electromagnet.

16. A current-carrying coil of wire, often with an iron core, that behaves as a magnet is called a(n) _____.
(A) Electromagnet
(B) Voltaic cell
(C) Permanent magnet
(D) Heating element

Ans :

(A) Electromagnet
An electromagnet is a temporary magnet created by passing an electric current through a coil of wire. The magnetic field exists only when the current is flowing and can be turned on and off, which is its primary advantage.

17. Which of the following is NOT a factor that affects the amount of heat generated in a wire?
(A) The material the wire is made from.
(B) The thickness and total length of the wire.
(C) The amount of current flowing through it.
(D) The color of the wire's outer insulation.

Ans :

(D) The color of the wire's outer insulation.
The heat generated depends on the wire's physical properties like its material, length, and thickness (which determine its resistance), and the amount of current. The color of the outer insulation is for identification and does not affect the heat produced.

18. Household appliances like electric room heaters, irons, and hair dryers work on which principle of electricity?
(A) The magnetic effect
(B) The chemical effect
(C) The heating effect
(D) The Voltaic effect

Ans :

(C) The heating effect
These appliances contain a heating element, which is a coil or rod made of a material with high resistance. When a current passes through this element, it gets very hot, converting electrical energy into useful heat for heating, ironing, or drying.

NODIA

19. What is the main difference between an electromagnet and a permanent magnet like a bar magnet?
(A) An electromagnet has two poles, but a permanent magnet has one.
(B) An electromagnet's magnetism can be switched on and off.
(C) A permanent magnet is consistently stronger than an electromagnet.
(D) An electromagnet is made of iron, and a permanent magnet of copper.

Ans :

(B) An electromagnet's magnetism can be switched on and off.
The key feature of an electromagnet is its temporary magnetism, which is controlled by the flow of electric current. A permanent magnet retains its magnetic properties without needing an external power source.

Download INDIA's Best Study app NODIA

20. What causes the Earth to behave like a giant magnet?
(A) The movement of liquid iron in its core, creating electric currents.
(B) The large amount of iron ore that is found on its surface.
(C) The combined gravitational pull of the Sun and the Moon.
(D) The presence of the large atmosphere and the vast oceans.

Ans :

(A) The movement of liquid iron in its core, creating electric currents.
The Earth's magnetic field is generated by a geodynamo effect. The convection currents of molten iron and nickel in the outer core produce electric currents, which in turn generate the planet's vast magnetic field.

21. A student builds an electromagnet using a coil of wire, an iron nail, and one electric cell. The electromagnet can pick up 5 paper clips. What is the most likely outcome if the student uses a battery of two cells?
(A) It will pick up fewer paper clips.
(B) It will not pick up any paper clips.
(C) It will repel the paper clips.
(D) It will pick up more than 5 paper clips.

Ans :

(D) It will pick up more than 5 paper clips.
Using a battery with two cells increases the electric current flowing through the coil. A stronger current produces a stronger magnetic field, which allows the electromagnet to attract and lift a greater number of paper clips.

22. What are the two different metal plates in a Voltaic cell called?
(A) Electrolytes (B) Terminals
(C) Electrodes (D) Coils

Ans :

(C) Electrodes
In a Voltaic or Galvanic cell, the two plates made of different metals are referred to as electrodes. A chemical reaction between these electrodes and the surrounding electrolyte is what generates the electric current.

23. A nichrome wire is to a heating element as a coil of wire around an iron core is to a(n) _____.
(A) Dry cell
(B) Electromagnet
(C) Switch
(D) Permanent magnet

Ans :

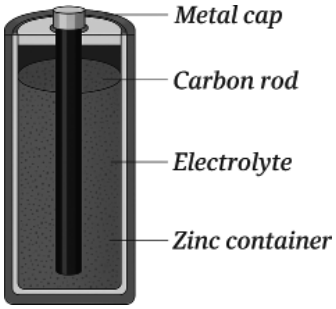
(B) Electromagnet
This analogy relates a component to the device it forms. A nichrome wire is the key component that serves as a heating element. Similarly, a coil of wire wrapped around an iron core is the fundamental structure of an electromagnet.

24. What is the function of the electrolyte in a Voltaic cell?
(A) It reacts chemically with the electrodes to produce electricity.
(B) It primarily acts as the container that holds the cell together.
(C) It serves as the main positive terminal connection of the cell.
(D) It prevents the cell from getting too hot during its operation.

Ans :

(A) It reacts chemically with the electrodes to produce electricity.
The electrolyte, typically a weak acid or salt solution, is an essential component of a Voltaic cell. It facilitates the chemical reaction with the two different metal electrodes, enabling the flow of ions and the generation of an electric current.

25. In the diagram of a dry cell , what component acts as the positive terminal?



Its internal structure

(A) The zinc container
(B) The electrolyte paste
(C) The outer plastic wrapping
(D) The carbon rod with a metal cap

Ans :

(D) The carbon rod with a metal cap
In a standard dry cell, the central carbon rod is the positive electrode (cathode). The metal cap on top serves as the external positive terminal where connections are made in a circuit.

26. How does a dry cell differ from the original Voltaic cell?
(A) A dry cell uses a liquid electrolyte; a Voltaic cell uses a paste.
(B) A dry cell is always rechargeable, while a Voltaic cell is not.
(C) A dry cell uses a paste-like electrolyte, making it more portable.
(D) A dry cell produces a magnetic field; a Voltaic cell does not.

Ans :

(C) A dry cell uses a paste-like electrolyte, making it more portable.
The primary innovation of the dry cell was replacing the liquid electrolyte of the Voltaic cell with a moist, thick paste. This made the cell more compact, spill-proof, and suitable for use in portable devices.

27. If you reverse the connections to the battery for an electromagnet, what will happen to its magnetic poles?
(A) The poles will switch places (North becomes South and vice versa).
(B) The poles will disappear.
(C) The poles will become stronger.
(D) Nothing will happen to the poles.

Click Here to Buy book on Amazon

Ans :

(A) The poles will switch places (North becomes South and vice versa).
The polarity of an electromagnet is determined by the direction of the current flowing through its coil. Reversing the battery connections reverses the direction of the current, which in turn reverses the orientation of the magnetic field, flipping the North and South poles.

28. The lifting electromagnets used in scrap yards work by _____.
(A) Heating the scrap metal until it becomes easy to lift.
(B) By switching a current on to lift metal and off to release it.
(C) Creating a permanent and very strong magnetic field.
(D) Using a sticky chemical substance applied to the crane.

Ans :

(B) By switching a current on to lift metal and off to release it.
Lifting electromagnets utilize the controllable nature of electromagnetism. A powerful electric current is switched on to generate a strong magnetic field to lift ferrous scrap. The current is then switched off to demagnetize the crane and release the load.

29. Why does a nichrome wire heat up more than a copper wire of the same size when the same current is passed through them?
(A) Because nichrome is a better conductor of electricity than copper.
(B) Because copper is magnetic and nichrome is not.
(C) Because nichrome is thicker than copper.
(D) Because nichrome offers higher resistance to the flow of current.

Ans :

(D) Because nichrome offers higher resistance to the flow of current.
The amount of heat generated is directly related to the material's electrical resistance. Nichrome has a much higher resistance than copper, meaning it opposes the flow of current more strongly, causing more electrical energy to be converted into heat.

30. What is a rechargeable battery?
(A) A battery that never runs out of power.
(B) A battery that uses a dry paste electrolyte.
(C) A battery that can be recharged and reused multiple times.
(D) A battery made from lemons and copper wires.

Ans :

(C) A battery that can be recharged and reused multiple times.
A rechargeable battery is a type of electrical battery which can be charged, discharged into a load, and recharged many times. This is in contrast to a disposable or primary battery, which is supplied fully charged and discarded after use.

NODIA

31. Alessandro Volta believed the electricity in Luigi Galvani's frog leg experiment came from the metals, not the frog. How did he test this idea?
(A) He replaced the frog's leg with saltwater-soaked paper and still got a current.
(B) He used a stronger frog.
(C) He used only one type of metal.
(D) He connected the metals to a compass instead.

Ans :

(A) He replaced the frog's leg with saltwater-soaked paper and still got a current.
To prove his hypothesis, Volta removed the biological component. By demonstrating that an electric current could be generated using two different metals and an electrolyte (saltwater), he showed that the electricity was a result of a chemical reaction, not "animal electricity."

32. In a lemon cell, the _____ and the _____ act as the metal electrodes.
(A) Lemon juice, lemon peel
(B) Water, salt
(C) Cardboard, safety pin
(D) Copper wire, iron nail

Ans :

(D) Copper wire, iron nail
To create a simple Voltaic cell with a lemon, two different metals are needed to serve as electrodes. The copper wire acts as one electrode, and the iron (or zinc) nail acts as the other, with the acidic lemon juice serving as the electrolyte.

33. Lithium-ion (Li-ion) batteries, commonly found in mobile phones and laptops, are a type of _____.
(A) Dry cell
(B) Rechargeable battery
(C) Voltaic cell
(D) Electromagnet

Ans :

(B) Rechargeable battery
Lithium-ion batteries are the most common type of rechargeable battery used in modern portable electronics. Their popularity stems from their high energy density, slow self-discharge, and ability to be recharged hundreds or thousands of times.

34. Which statement about the Earth's magnetic field is incorrect?
(A) It is strongest at the equator and weakest at the poles.
(B) It is generated by electric currents in the Earth's core.
(C) It helps protect life on Earth from harmful particles from space.
(D) Many migratory animals use it for navigation.

Ans :

(A) It is strongest at the equator and weakest at the poles.
The Earth's magnetic field is strongest near its magnetic poles (which are close to the geographic North and South poles) and is weakest near the magnetic equator. All the other statements are correct descriptions of its origin and function.

35. If an incandescent lamp glows when connected in a circuit, it is a demonstration of which effect of electric current?
(A) The magnetic effect
(B) The chemical effect
(C) The physiological effect
(D) The heating effect

Ans :

(D) The heating effect
An incandescent lamp works because the electric current heats its thin filament to a very high temperature. This intense heat causes the filament to glow brightly, producing light. This is a direct application of the heating effect of current.

36. A student wraps 50 turns of wire around an iron nail to make an electromagnet. To make a weaker electromagnet using the same nail and battery, the student should _____.
(A) Wrap 100 turns of wire
(B) Use a thicker iron nail
(C) Use a shorter piece of wire with fewer turns (e.g., 25 turns)
(D) Connect two batteries in series

Ans :

(C) use a shorter piece of wire with fewer turns (e.g., 25 turns)
The strength of an electromagnet is directly proportional to the number of turns in its coil. By reducing the number of turns from 50 to 25, while keeping the current the same, the student will create a weaker magnetic field.

37. The region around a magnet or a current-carrying wire where its magnetic effect can be felt is called its _____.
(A) Electric circuit
(B) Magnetic field
(C) Electrolyte
(D) Heating element

Ans :

(B) Magnetic field
A magnetic field is an invisible field that describes the magnetic influence on magnetic materials or moving electric charges. The deflection of a compass needle is a way of detecting and visualizing the presence of this field.

38. In a Voltaic cell, where does the electric current come from?
(A) A chemical reaction between the electrodes and the electrolyte.
(B) The heat of the surrounding room.
(C) A small magnet hidden inside the cell.
(D) The container holding the liquid.

Ans :

(A) A chemical reaction between the electrodes and the electrolyte.
A Voltaic cell is a type of electrochemical cell that converts stored chemical energy into electrical energy. This conversion happens through spontaneous redox reactions between the two different metal electrodes and the electrolyte solution.

39. Why is it important to properly dispose of used batteries in 'e-waste' facilities?
(A) Because they can still be used to power very small devices.
(B) Because they are magnetic and can disrupt nearby compasses.
(C) Because they can be refilled with a new electrolyte and reused.
(D) Because they contain materials that should be properly recycled.

Ans :

(D) Because they contain materials that should be properly recycled.

NODIA

Used batteries contain heavy metals like lead and cadmium, which are toxic to the environment if they end up in landfills. They also contain valuable materials like lithium and cobalt that can be recovered and reused, conserving natural resources.

40. How does the purpose of the wire in an electric heater differ from the wire in a lifting electromagnet?
(A) In a heater, the wire is a good conductor; in an electromagnet, a poor one.
(B) In a heater, the wire produces heat; in an electromagnet, it produces a magnetic field.
(C) There is no difference in purpose; both use the wire to produce heat.
(D) The wire in a heater is temporary, while in an electromagnet it is permanent.

Ans :

(B) In a heater, the wire produces heat; in an electromagnet, it produces a magnetic field.
Both devices use electric current, but for different effects. An electric heater uses a high-resistance wire to maximize the heating effect. An electromagnet uses a low-resistance wire (usually copper) coiled to maximize the magnetic effect.

41. Positive terminal is to carbon rod as negative terminal is to _____ in a dry cell.
(A) Electrolyte paste
(B) Metal cap
(C) Zinc container
(D) Outer wrapping

Ans :

(C) Zinc container
This analogy relates the components of a dry cell to their electrical roles. The central carbon rod with its metal cap serves as the positive terminal (cathode). The outer casing, made of zinc, serves as the negative terminal (anode).

42. Why are the wires used for household electrical connections typically made of copper, not nichrome?
(A) Because copper has low resistance and minimizes heat loss.
(B) Because copper is a better insulator.
(C) Because nichrome is much cheaper than copper.
(D) Because copper produces a stronger magnetic field.

Ans :

(A) Because copper has low resistance and minimizes heat loss.
For efficient electricity transmission, it is important to minimize the energy lost as heat. Copper has very low electrical resistance, allowing current to flow easily with minimal heat generation. Nichrome, with its high resistance, would get dangerously hot.

43. A rechargeable battery in a phone stops holding its charge for as long after a few years of use. This happens because _____.
(A) The phone itself is getting older and less efficient.
(B) The battery slowly becomes too small to fit the phone properly.
(C) The phone's operating system software is frequently updated.
(D) The battery's chemicals wear out with each charge-discharge cycle.

Ans :

(D) The battery's chemicals wear out with each charge-discharge cycle.
The chemical reactions in a rechargeable battery are not perfectly reversible. With each cycle of charging and discharging, small, irreversible changes occur in the electrodes and electrolyte, gradually reducing the battery's capacity to store energy.

44. What happens to the magnetic field of an electromagnet when the electric current is switched off?
(A) It becomes stronger.
(B) It disappears.
(C) It reverses its poles.
(D) It becomes permanent.

Ans :

(B) It disappears.
The magnetic field of an electromagnet is directly produced by the flow of electric current through its coil. When the current stops, the source of the magnetism is removed, and the magnetic field collapses and disappears.

45. In the circuit shown in Figure 4.1a, what is the purpose of the safety pin and drawing pins?
(A) They function as a simple switch.
(B) They act as the battery.
(C) They are the source of magnetism.
(D) They serve as the connecting wires.

Ans :

Downloaded from www.pdf.tube

(A) They function as a simple switch.
The arrangement of a safety pin that can pivot to touch two drawing pins creates a simple manual switch. When the pin touches both drawing pins, the circuit is closed (ON). When it is moved away, the circuit is open (OFF).

46. The main purpose of a 'heating element' in an appliance like an electric stove is to _____.
(A) Conduct electricity with minimal heat loss
(B) Produce a strong magnetic field
(C) Store electrical energy for later use
(D) Efficiently convert electrical energy into heat energy

Ans :

(D) Efficiently convert electrical energy into heat energy
A heating element is specifically designed with high electrical resistance. This property causes it to strongly oppose the flow of current, leading to an efficient conversion of electrical energy into a large amount of thermal energy (heat).

47. If you cut a bar magnet in half, you get two smaller magnets, each with a North and South pole. This concept also applies to an electromagnet, which means it must have _____.
(A) No poles
(B) Only one pole
(C) Two poles
(D) Four poles

Ans :

(C) Two poles
All magnets, whether permanent or electromagnetic, are dipoles, meaning they have two opposite poles (North and South). The magnetic field lines flow from the North pole to the South pole, and this fundamental property holds true for electromagnets as well.

48. Which of the following statements about a lemon cell is incorrect?
(A) It can be recharged by plugging it into a wall socket.
(B) It is a type of Voltaic cell.
(C) It uses lemon juice as an electrolyte.
(D) It requires two different metals as electrodes, like copper and iron.

Ans :

(A) It can be recharged by plugging it into a wall socket.
A lemon cell is a primary cell, meaning it produces electricity through an irreversible chemical reaction. Once the chemical reactants are consumed, it cannot be recharged. Rechargeable batteries use reversible chemical reactions.

NODIA

49. A very strong electromagnet is needed for an industrial crane. Which design choice would be most effective?
(A) A small coil with very few turns and a weak electric current.
(B) A large iron core with many turns of wire and a strong current.
(C) A coil with no iron core and a very weak electric current.
(D) A long, thin copper wire with a weak electric current.

Ans :

(B) A large iron core with many turns of wire and a strong current.
To maximize the strength of an electromagnet, all contributing factors should be maximized. Using a large iron core, wrapping it with a coil containing a high number of turns, and passing a strong electric current through it will produce the most powerful magnetic field.

50. A battery from a car or an inverter is a common example of what type of battery?
(A) A single-use dry cell
(B) A lemon cell
(C) A non-electric power source
(D) A rechargeable battery

Ans :

(D) A rechargeable battery
Batteries used in applications like cars and inverters must be able to be discharged to provide power and then recharged to be used again. These lead-acid batteries are a classic example of large, powerful rechargeable batteries.

51. Why do electric heating appliances like toasters and irons have coils of wire instead of a straight wire?
(A) Coiling allows a long length of wire to fit into a compact space.
(B) Coiling the wire makes it look neater.
(C) The coil shape creates a magnetic field for heating.
(D) Coiling reduces the electrical resistance of the wire.

Ans :

(A) Coiling allows a long length of wire to fit into a compact space.
The amount of heat produced depends on the length of the resistance wire. By coiling a very long wire, a large amount of heat can be generated within a small, confined area, which is essential for the efficient operation of these appliances.

52. A student places a compass on a table and it points North. They then bring a wire connected to a battery near the compass, and the needle points East. What does this demonstrate?
(A) The Earth's magnetic field has disappeared.
(B) The magnetic field from the current in the wire is stronger at that location than the Earth's magnetic field.
(C) The compass is broken.
(D) The battery is producing heat.

Ans :

(B) The magnetic field from the current in the wire is stronger at that location than the Earth's magnetic field.
The compass needle aligns itself with the strongest magnetic field present. The significant deflection from North to East shows that the magnetic field created by the electric current is dominant and has overpowered the Earth's weaker magnetic field at that point.

53. A simple Voltaic cell can be made with two different _____ and a liquid _____.
(A) Plastics, oil
(B) Wires, magnet
(C) Glasses, gel
(D) Metals, electrolyte

Ans :

(D) Metals, electrolyte
The fundamental components of a Voltaic cell are two dissimilar metal electrodes (like copper and zinc) and an electrolyte (like a salt solution or acid). The chemical potential difference between the metals drives the reaction that produces electricity.

54. Which of the following statements about electric current and its effects is correct?
(A) All wires get equally hot when the same current passes through them.
(B) The magnetic effect of current is used in electric stoves.
(C) An electric current can produce both a magnetic field and heat.
(D) A dead battery can be recharged by heating it.

Ans :

(C) An electric current can produce both a magnetic field and heat.
An electric current flowing through a conductor simultaneously produces two main effects : a magnetic field around the conductor and a heating effect within the conductor due to its resistance. Both effects are fundamental properties of electricity.

55. What is the term for the opposition or resistance that a conductor offers to the flow of electric current?
(A) Electrical resistance
(B) Voltage
(C) Magnetism
(D) Electrolysis

Ans :

(A) Electrical resistance
Electrical resistance is a measure of the difficulty to pass an electric current through a conductor. Materials with high resistance impede the current flow more, causing more energy to be converted into heat.

56. If you want to make an electromagnet where end A is a North pole, but your experiment shows it is a South pole, what should you do?
(A) Use a stronger battery.
(B) Reverse the connections to the battery.
(C) Add more turns to the coil.
(D) Replace the iron core with a copper core.

Ans :

(B) Reverse the connections to the battery.
Reversing the battery terminals will reverse the direction of the electric current flowing through the coil. According to the right-hand grip rule, reversing the current direction will reverse the magnetic polarity of the electromagnet, changing the South pole to a North pole.

57. ON/OFF is to a switch as temporary magnetism is to an _____.
(A) Permanent magnet
(B) Battery
(C) Nichrome wire
(D) Electromagnet

Ans :

(D) Electromagnet

Click Here to Buy book on Amazon

This analogy relates a function to a device. A switch's function is to turn a circuit ON or OFF. An electromagnet's key feature is its temporary magnetism, which can be turned ON or OFF with the electric current.

58. Which of the following appliances does NOT primarily use the heating effect of electric current?
(A) Electric kettle
(B) Immersion rod
(C) Electric fan
(D) Electric iron

Ans :

(C) Electric fan
An electric fan works on the magnetic effect of electric current. The current creates a magnetic field inside the motor, causing it to rotate and turn the fan blades. The other appliances are all designed to convert electricity into heat.

59. What is a key difference in the composition of a dry cell's electrolyte compared to a simple Voltaic cell?
(A) The dry cell uses a thick moist paste, while the Voltaic cell uses a liquid.
(B) The dry cell's electrolyte is solid, while the Voltaic cell's is a gas.
(C) The dry cell has no electrolyte.
(D) The dry cell's electrolyte is a metal, while the Voltaic cell's is a non-metal.

Ans :

(A) The dry cell uses a thick moist paste, while the Voltaic cell uses a liquid.
The main advancement of the dry cell was immobilizing the electrolyte. Instead of a free-flowing liquid that could spill, it uses a paste, making the cell portable and usable in any orientation.

60. What happens to iron paper clips attached to an electromagnet when the circuit is opened (current is stopped)?
(A) The clips get hotter.
(B) The clips fall off.
(C) The clips become permanently magnetized.
(D) More clips are attracted.

Ans :

(B) The clips fall off.
When the electric current to an electromagnet is cut off, its magnetic field disappears almost instantly. Without the magnetic force to hold them, the iron paper clips are released and fall due to gravity.

61. Overheating in household circuits, which can damage plugs or even cause fires, is an undesirable consequence of which effect?
(A) The magnetic effect of current.
(B) The chemical effect of current.
(C) The Voltaic effect of current.
(D) The heating effect of current.

Ans :

(D) The heating effect of current.
While useful in appliances, the heating effect is a potential hazard in wiring. If too much current flows or if there's a poor connection, the wires can overheat significantly, melting insulation and creating a fire risk.

NODIA

62. A student builds a lemon battery with one lemon, a copper strip, and an iron nail, but the LED does not glow. What is the most likely reason?
(A) A single lemon cell produces a very small amount of electricity, not enough to light an LED.
(B) Lemons cannot conduct electricity.
(C) The LED is broken.
(D) Copper and iron are not metals.

Ans :

(A) A single lemon cell produces a very small amount of electricity, not enough to light an LED.
While a single lemon cell does produce an electric potential, the voltage and current are typically too low to power an LED. .

63. The positive and negative ends of a cell or battery are called _____.
(A) Circuits
(B) Terminals
(C) Electrolytes
(D) Coils

Ans :

(B) Terminals
Terminals are the specific points on an electrical component, like a cell or battery, where connections are made to an external circuit. They are designated as positive (+) and negative (-) to indicate the direction of conventional current flow.

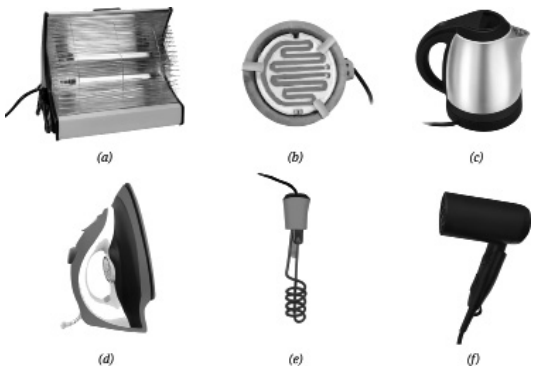
Download INDIA's Best Study app NODIA

64. In a simple circuit, what is the role of the connecting wires?
(A) To generate the electricity.
(B) To act as a switch to turn the circuit on and off.
(C) To provide a path for the electric current to flow.
(D) To create heat in the circuit.

Ans :

(C) To provide a path for the electric current to flow.
Connecting wires, typically made of a good conductor like copper, serve as the pathway for electric current. They connect the components of a circuit, such as the battery and the lamp, allowing electrons to flow from the negative terminal to the positive terminal.

65. Looking at the household appliances in figure, what do they all have in common?



Simple household electric heating appliances (a) Room heater; (b) Electric stove; (c) Electric kettle; (d) Electric iron; (e) Water heating immersion coil; or (f) Hair dryer

(A) They all use electric motors.
(B) They are all used for cooking.
(C) They are all battery-operated.
(D) They all contain a heating element.

Ans :

(D) They all contain a heating element.
The figure shows a room heater, stove, kettle, iron, immersion rod, and hair dryer. The primary function of each of these devices is to generate heat, and they all achieve this by passing an electric current through a high-resistance heating element.

66. The discovery that electricity and magnetism are linked was revolutionary because it _____.
(A) Showed that two separate forces of nature were actually connected.
(B) Proved that strong magnets could be made from pieces of wood.
(C) Led to the development of many new and improved types of batteries.
(D) Explained the scientific reason for why the Earth is perfectly round.

Ans :

(A) Showed that two separate forces of nature were actually connected.
Before Oersted's discovery, electricity and magnetism were considered entirely distinct phenomena. Finding a connection between them was a profound scientific breakthrough that unified these forces and paved the way for technologies like electric motors and generators.

67. In a lemon cell experiment using a copper strip and an iron nail, the lemon juice acts as the _____.
(A) Positive electrode
(B) Negative electrode
(C) Connecting wire
(D) Electrolyte

Ans :

(D) Electrolyte
The acidic juice of the lemon serves as the electrolyte. It provides the medium through which ions can move between the two different metal electrodes (copper and iron), allowing the chemical reaction that generates an electric current to take place.

68. If an electric iron gets too hot and its plastic parts start to melt, this is a sign of _____.
(A) Normal operation
(B) The magnetic effect working properly
(C) Overheating due to the heating effect
(D) The battery running out

Ans :

(C) Overheating due to the heating effect
The melting of plastic parts is a clear indication that the appliance has become dangerously hot. This is an undesirable consequence of the heating effect of current, often caused by a fault in the device or the electrical circuit.

69. Which of the following is NOT a characteristic of an electromagnet?
(A) Its strength can be changed by varying the current.
(B) Its poles can be reversed.
(C) It has a North and a South pole.
(D) It is a permanent magnet.

Downloaded from www.pdf.tube

Ans :

(D) It is a permanent magnet.
The defining characteristic of an electromagnet is that its magnetism is temporary and dependent on the flow of electric current. It is not a permanent magnet, which retains its magnetism without an external power source.

70. What is the direct result of a chemical reaction taking place inside a battery?
(A) Generation of an electric current.
(B) Generation of heat only.
(C) Generation of a magnetic field only.
(D) Generation of light.

Ans :

(A) Generation of an electric current.
A battery is an electrochemical device that converts stored chemical energy into electrical energy. The chemical reactions that occur within the battery create a potential difference (voltage) between its terminals, which drives an electric current when a circuit is connected.

71. A student touches a nichrome wire in a circuit before the switch is turned on and it feels cool. After the current flows for 30 seconds, the wire feels warm. This change is due to the _____.
(A) Magnetic effect of current
(B) The conversion of electrical energy to heat energy
(C) Wire absorbing heat from the room
(D) Battery cooling down and transferring coldness to the wire

Ans :

(B) The conversion of electrical energy to heat energy
The wire warms up because its electrical resistance opposes the flow of current. This opposition causes the energy carried by the electric charges to be converted into thermal energy, a phenomenon known as the heating effect of electric current.

72. Zinc container is to negative terminal as _____ is to positive terminal in a dry cell.
(A) Electrolyte paste
(B) Outer casing
(C) Carbon rod
(D) Bottom plate

Ans :

(C) Carbon rod
This analogy identifies the components that function as the terminals of a dry cell. The outer zinc can acts as the negative electrode, while the central carbon rod acts as the positive electrode.

NODIA

73. A major advantage of a rechargeable Li-ion battery over a single-use dry cell is its _____.
(A) Smaller size
(B) Lower initial cost
(C) Simpler internal structure
(D) Ability to be reused many times

Ans :

(D) Ability to be reused many times
The primary benefit of a rechargeable battery is sustainability and long-term cost-effectiveness. It can be restored to full charge and reused hundreds or thousands of times, unlike a single-use cell which must be discarded after being depleted.

74. What is the role of the iron core in a lifting electromagnet used in a scrap yard?
(A) It makes the magnetic field much stronger to lift heavy objects.
(B) It provides a path for the current to flow.
(C) It keeps the coil from overheating.
(D) It helps in sorting non-magnetic materials.

Ans :

(A) It makes the magnetic field much stronger to lift heavy objects.
For industrial applications like lifting heavy scrap metal, a very powerful magnet is required. Inserting a large iron core inside the current-carrying coil dramatically amplifies the magnetic field, creating the necessary lifting force.

75. Which statement correctly describes the poles of an electromagnet?
(A) An electromagnet has only a North pole and no South pole.
(B) The poles are permanently fixed and cannot ever be changed.
(C) It has a North and South pole, which can be reversed.
(D) The strength of the poles is always the same, regardless of current.

Ans :

(C) It has a North and South pole, which can be reversed.
Like a permanent magnet, an electromagnet is a dipole with both a North and a South pole. A unique feature is that its polarity is dependent on the direction of current flow; reversing the current will flip the North and South poles.

76. Hans Christian Oersted's experiment showed that a(n) _____ is produced around a wire carrying an _____.
(A) Electric field, electrolyte
(B) Magnetic field, electric current
(C) Heating element, electromagnet
(D) Electric charge, open circuit

Ans :

(B) Magnetic field, electric current
Oersted's discovery was the fundamental link between electricity and magnetism. He demonstrated that whenever an electric current flows through a conductor, it generates a corresponding magnetic field in the surrounding space.

77. A material, such as nichrome, used in an electric heater because it has high resistance and gets very hot is called a(n) _____.
(A) Conductor
(B) Insulator
(C) Electrode
(D) Heating element

Ans :

(D) Heating element
A heating element is the specific component within a heating appliance that is designed to convert electrical energy into heat. It is made from a material with high electrical resistance to maximize this energy conversion.

78. Why would an electric motor not work if it were based on the heating effect of current instead of the magnetic effect?
(A) The heating effect cannot produce motion.
(B) The heating effect is too weak.
(C) The heating effect only works with batteries.
(D) The heating effect would make the motor too cold.

Ans :

(A) The heating effect cannot produce motion.
The function of a motor is to produce rotational motion. This is achieved by the magnetic effect, where forces of attraction and repulsion between magnets and electromagnets cause the motor to spin. The heating effect simply produces thermal energy, not mechanical force.

79. A student connects the ends of a wire to a cell for a few seconds. The student notices that the cell becomes slightly warm. This is due to the _____.
(A) Magnetic effect of the cell
(B) Cell's internal resistance causing a heating effect
(C) Cell absorbing heat from the student's hand
(D) Chemical reaction stopping inside the cell

Ans :

(B) Cell's internal resistance causing a heating effect
Just like connecting wires, the internal components of a cell also have some electrical resistance. When the cell supplies current, this internal resistance causes a portion of the chemical energy to be converted into heat, making the cell warm.

80. How does the electrolyte in a lemon cell differ from the electrolyte in a car battery?
(A) The lemon cell has no electrolyte.
(B) The car battery uses a paste, while the lemon cell uses a solid.
(C) Lemon juice is a weak acid, while a car battery uses a strong acid.
(D) There is no difference in the electrolyte.

Ans :

(C) Lemon juice is a weak acid, while a car battery uses a strong acid.
While both are electrolytes, their chemical nature and strength differ significantly. The citric acid in lemon juice is a weak organic acid. A lead-acid car battery uses a much stronger and more corrosive inorganic acid, sulfuric acid, to produce a much higher current.

81. The most common type of rechargeable battery used in modern devices like smart phones and lap tops is the _____.
(A) Voltaic cell
(B) Lead-acid battery
(C) Lithium-ion (Li-ion) battery
(D) Dry cell

Ans :

(C) Lithium-ion (Li-ion) battery
Lithium-ion batteries have become the standard for portable electronics because they offer a high energy density (more power in a smaller size), a long lifespan, and a slower rate of self-discharge compared to other rechargeable battery technologies.

Download INDIA's Best Study app NODIA

Click Here to Buy book on Amazon

MATCHING TYPE QUESTIONS

82. Match the fundamental effects of electric current with their correct description.

	Column A		Column B
1	Magnetic Effect of Current	A	A temporary magnet created by passing an electric current through a coil of wire.
2	Heating Effect of Current	B	The generation of a magnetic field around a conductor when electricity flows through it.
3	Electromagnet	C	The opposition to the flow of current in a wire, which causes it to get warm.
4	Resistance	D	The phenomenon where a conductor gets heated up due to the flow of electric current.

Options

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-D, 2-C, 3-B, 4-A
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(c) 1-B, 2-D, 3-A, 4-C
The magnetic effect is the creation of a magnetic field by a current. The heating effect is the warming of a conductor by that current. An electromagnet is a current-carrying coil. Resistance is what causes the heating effect.

83. Match the type of electric cell or its component with the correct description.

	Column A		Column B
1	Voltaic Cell	A	The liquid or moist paste inside a cell that reacts chemically with the electrodes to produce electricity.
2	Dry Cell	B	A cell that generates electricity using two different metal plates dipped in a liquid electrolyte.
3	Rechargeable Battery	C	A common single-use cell where the electrolyte is a thick moist paste instead of a liquid.
4	Electrolyte	D	A type of battery that can be charged and reused multiple times, such as a lithium-ion battery.

Options

(a) 1-D, 2-A, 3-C, 4-B
(b) 1-B, 2-C, 3-D, 4-A
(c) 1-A, 2-B, 3-D, 4-C
(d) 1-C, 2-D, 3-A, 4-B

Ans :

(b) 1-B, 2-C, 3-D, 4-A
A Voltaic cell uses two different metals and a liquid electrolyte. A dry cell uses a paste electrolyte and is for single use. Rechargeable batteries can be reused many times. An electrolyte is the conducting medium in a cell.

Download INDIA's Best Study app NODIA

84. Match the term related to electromagnets with its correct property or discoverer.

	Column A		Column B
1	Strength of Electromagnet	A	The scientist who first discovered the magnetic effect of electric current.
2	Iron Core	B	The North and South ends of the electromagnet, which can be reversed by changing the current's direction.
3	Polarity of Electromagnet	C	Can be increased by using more electric current or increasing the number of turns in the coil.
4	Hans Christian Oersted	D	A piece of iron inserted into a current-carrying coil to make the magnetic field much stronger.

Options

Downloaded from www.pdf.tube

(a) 1-C, 2-D, 3-B, 4-A
(b) 1-B, 2-A, 3-D, 4-C
(c) 1-D, 2-C, 3-A, 4-B
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(a) 1-C, 2-D, 3-B, 4-A
An electromagnet's strength depends on current and coil turns. An iron core is used to make it stronger. Its polarity can be reversed. Oersted discovered the link between electricity and magnetism.

85. Match the electrical component or appliance with the effect it is based on.

	Column A		**Column B**
1	Electric Iron	A	Its needle deflects when current flows nearby, demonstrating the magnetic effect of current.
2	Magnetic Compass	B	A wire with high resistance that gets very hot, making it ideal for heating elements.
3	Lifting Electromagnet	C	An appliance that uses the heating effect of electric current to press clothes.
4	Nichrome Wire	D	A device used in cranes that works on the magnetic effect of electric current to lift iron and steel.

Options
(a) 1-A, 2-C, 3-B, 4-D
(b) 1-C, 2-A, 3-D, 4-B
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-D, 2-B, 3-C, 4-A

Ans :

(b) 1-C, 2-A, 3-D, 4-B
An electric iron works on the heating effect. A magnetic compass needle deflects due to the magnetic effect. A lifting electromagnet uses the magnetic effect to lift metals. Nichrome wire is used for its high resistance to produce heat.

86. Match the scientist with their key discovery or invention.

	Column A		**Column B**
1	Alessandro Volta	A	Noticed a compass needle deflecting near a current-carrying wire, linking electricity and magnetism.
2	Luigi Galvani	B	A device used in scrap yards that can pick up and release iron objects by switching the current on and off.
3	Hans Christian Oersted	C	Observed a dead frog's leg twitching when touched by two different metals, sparking early ideas about electricity.
4	Lifting Electromagnet	D	Proved that electricity could be generated from two different metals and a liquid, leading to the first battery.

Options
(a) 1-D, 2-C, 3-A, 4-B
(b) 1-C, 2-D, 3-B, 4-A
(c) 1-B, 2-A, 3-D, 4-C
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(a) 1-D, 2-C, 3-A, 4-B
Alessandro Volta invented the first battery by showing two metals and a liquid produce current. Galvani's frog leg experiment preceded this. Oersted discovered the magnetic effect of current. A lifting electromagnet is a practical application of this effect.

NODIA

TRUE AND FALSE

87. A wire that is carrying an electric current will not produce any magnetic effects.

Ans :

False

When electric current flows through a conductor like a wire, it produces a magnetic field around it. This is known as the magnetic effect of electric current.

88. An electromagnet is a type of permanent magnet that holds its magnetic properties even when the electricity is shut off.

Ans :

False
An electromagnet is temporary; it only behaves like a magnet when an electric current flows through its coil and loses its magnetism when the current stops.

89. The strength of an electromagnet can be increased by either increasing the number of turns in its coil or by increasing the flow of electric current.

Ans :

True
The strength of an electromagnet can be modified by changing the amount of electric current flowing through the coil or by adjusting the number of turns in the coil.

90. The North and South poles of an electromagnet are fixed and cannot be reversed.

Ans :

False
It is possible to reverse the poles of an electromagnet simply by changing the direction of the electric current that flows through the coil.

91. The heating effect of electric current is caused by conductors offering zero resistance to the flow of electricity.

Ans :

False
The heating effect occurs because a conductor offers resistance to the current, which causes some of the electrical energy to be converted into heat energy.

92. A Voltaic cell produces electricity through a chemical reaction involving two electrodes made of the same metal.

Ans :

False
A Voltaic cell requires two metal plates, called electrodes, made of different materials to generate electricity through a chemical reaction with an electrolyte.

93. Dry cells are referred to as 'dry' because their electrolyte is a thick, moist paste rather than a liquid.

Ans :

True
A dry cell is called 'dry' because its electrolyte is not a liquid but a thick moist paste, making it more convenient for everyday use than a Voltaic cell.

94. All types of batteries, including dry cells and rechargeable batteries, can be recharged and used multiple times.

Ans :

False
Dry cells are designed for a single use and must be disposed of afterward. Only rechargeable batteries are designed to be recharged and reused many times.

95. The scientist Hans Christian Oersted was the first to discover the connection between electricity and magnetism.

Ans :

True
In 1820, Hans Christian Oersted discovered that electricity and magnetism were linked after he noticed a compass needle deflecting near a wire when an electric circuit was opened or closed.

96. Placing an iron core inside a current-carrying coil will weaken the resulting electromagnet.

Ans :

False
Inserting an iron nail into the core makes the coil a stronger magnet. For practical uses, most electromagnets have an iron core to increase their strength.

Download INDIA's Best Study app NODIA

97. Earth behaves like a giant magnet because of the movement of liquid iron in its core, which generates electric currents.

Ans :

True

Click Here to Buy book on Amazon

The movement of liquid iron deep inside the Earth's core creates electric currents, which in turn generate the planet's magnetic field.

98. Rechargeable batteries, such as the common lithium-ion batteries, do not wear out and can last forever.

Ans :

False
Rechargeable batteries do not last forever. After many cycles of being charged and used, they slowly wear out and hold less charge.

99. The amount of heat generated in a wire by an electric current is not affected by the magnitude of the current.

Ans :

False
The heat produced in a wire is dependent on the magnitude of the electric current flowing through it. More current results in more heat.

100. It is safe to dispose of old, 'dead' batteries in the regular trash because they no longer contain any harmful materials.

Ans :

False
Even when a battery stops working, it can still contain harmful materials like acids and heavy metals that can damage the environment. They should be recycled as e-waste.

101. An electromagnet has two poles—a North and a South—just like a permanent bar magnet.

Ans :

True
Just like a standard magnet, an electromagnet also has two poles, a North and a South pole, and it can attract or repel other magnets accordingly.

VERY SHORT QUESTIONS

102. What is the magnetic effect of electric current?

Ans :

The magnetic effect of electric current is the phenomenon where an electric current flowing through a conductor, like a wire, produces a magnetic field.

103. Why does a compass needle deflect near a current-carrying wire?

Ans :

A compass needle deflects because the current creates a magnetic field around the wire, and this field exerts a magnetic effect on the tiny magnet.

104. What is an electromagnet?

Ans :

An electromagnet is a type of magnet in which the magnetic field is produced by an electric current flowing through a coil of wire.

105. How does inserting an iron nail into a current-carrying coil affect its strength?

Ans :

Inserting an iron nail into the core of a current-carrying coil makes it a much stronger magnet, increasing the deflection of a nearby compass.

106. Who discovered the link between electricity and magnetism?

Ans :

The link between electricity and magnetism was discovered by the scientist Hans Christian Oersted in the year 1820, during a university demonstration.

107. Explain why an electromagnet is considered a temporary magnet.

Ans :

An electromagnet is temporary because its magnetic field exists only when electric current flows through its coil and disappears when the current is stopped.

108. What are the two poles of an electromagnet called?

Ans :

Just like a permanent bar magnet, an electromagnet also has two poles which are referred to as the North pole and the South pole.

109. How can the polarity of an electromagnet's poles be reversed?

Ans :

The polarity of an electromagnet's poles can be easily reversed simply by changing the direction of the electric current flowing through its coil.

NODIA

110. List two devices that use the magnetic effect of electric current.

Ans :

The magnetic effect of electric current has many practical applications, such as in devices like electric bells, motors, fans, and loudspeakers.

111. Compare the magnetic field produced by a single cell versus a battery.

Ans :

A single cell provides a small current, creating a weak magnetic field, while a battery with more cells gives a larger current, creating a stronger field.

112. What is the heating effect of electric current?

Ans :

The heating effect of electric current is the warming of a conductor that occurs when an electric current passes through it due to resistance.

113. Why does a nichrome wire get hot when current passes through it?

Ans :

A nichrome wire gets hot because it offers high resistance to the flow of current, causing electrical energy to be converted into heat energy.

114. What is a heating element in an electrical appliance?

Ans :

A heating element is a rod or a coil of wire, often made of a material like nichrome, contained in appliances to produce heat.

115. Explain why using a battery with more cells heats a wire more.

Ans :

A battery with more cells produces a larger electric current, and since the heat generated depends on the magnitude of the current, the wire gets hotter.

116. What is a Voltaic cell?

Ans :

A Voltaic cell, or Galvanic cell, is a device that generates electricity through a chemical reaction between two different metal plates and an electrolyte.

117. Why are the components of a Voltaic cell called electrodes and electrolyte?

Ans :

The two different metal plates are called electrodes, and the liquid solution that facilitates the chemical reaction to produce electricity is called the electrolyte.

118. What happens when a Voltaic cell becomes 'dead'?

Ans :

A Voltaic cell becomes 'dead' when the chemicals inside it get used up over time, and it can no longer supply any more electricity.

119. Explain the role of lemon juice in a lemon-powered LED circuit.

Ans :

In a lemon cell, the lemon juice acts as the electrolyte, a substance that helps to conduct electricity between the copper and iron electrodes.

120. What is the main difference between a Voltaic cell and a dry cell?

Ans :

The main difference is that a Voltaic cell uses a liquid electrolyte, whereas a dry cell uses a thick, moist paste as its electrolyte.

Download INDIA's Best Study app NODIA

121. Identify the positive and negative terminals in a common dry cell.

Ans :

In a dry cell, the central carbon rod with a metal cap acts as the positive terminal, while the outer zinc container acts as the negative terminal.

122. What is the primary advantage of using rechargeable batteries?

Ans :

The primary advantage is that they can be recharged and reused multiple times, which prevents wastage and saves money over time for the user.

123. Why does a phone battery require more frequent charging after a year or two?

Ans :

Downloaded from www.pdf.tube

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

Rechargeable batteries slowly wear out after being charged and used many times, reducing their capacity to hold a charge and requiring more frequent charging.

124. What is the most common type of rechargeable battery used today?

Ans :

The most common type of rechargeable battery used in almost all modern devices is the lithium-ion (Li-ion) battery, which relies on special metals.

125. How does a lifting electromagnet release the objects it has picked up?

Ans :

A lifting electromagnet releases objects when the current is switched off, causing the magnetic field to disappear and the items to fall.

126. What generates the Earth's magnetic field?

Ans :

Deep inside the Earth, the movement of liquid iron in the core creates electric currents, which in turn generate the planet's massive magnetic field.

127. How does increasing the number of turns in a coil affect an electromagnet?

Ans :

Increasing the number of turns of the wire in the coil makes the electromagnet stronger, allowing it to attract more clips or deflect a compass more.

128. What happens to a compass needle when the current in a nearby wire stops?

Ans :

When the current stops, the magnetic effect disappears, and the compass needle is no longer deflected, returning to its original north-south direction.

129. Why is it advised not to connect wires to a cell for too long?

Ans :

It is advised not to connect wires to a cell for more than a few seconds because doing so can weaken the cell very quickly.

130. What is a magnetic field?

Ans :

A magnetic field is the region around a magnet or a current-carrying wire where its magnetic effect can be felt, such as by a compass.

131. Compare the resistance of a nichrome wire to a copper wire.

Ans :

A nichrome wire offers a significantly higher resistance to the flow of electric current compared to a copper wire of the same size and length.

132. What are the electrodes in a lemon cell made of?

Ans :

In the lemon cell experiment described, the metal electrodes consist of copper wires or strips and iron nails, which are inserted into the juicy lemon.

133. Why is it important to use appropriate wires and plugs in households?

Ans :

It is important to use wires, plugs, and sockets rated for the specified electric current to prevent unnecessary heating and potential damage or fires.

134. What are solid-state batteries?

Ans :

Solid-state batteries are a future technology that replaces the liquid or paste-like electrolytes with solid materials, making them safer and more efficient.

135. Explain how migratory birds use Earth's magnetic field.

Ans :

Many migratory birds, as well as fish and other animals, use the Earth's magnetic field to navigate across vast continents and oceans during migration.

136. What causes overheating in household appliances?

Ans :

Overheating in appliances can be caused by the heating effect of electric current, sometimes leading to melted plastic parts, damaged sockets, or even fires.

137. Why do lifting electromagnets use an iron core?

Ans :

NODIA

For practical applications, most lifting electromagnets are built with an iron core to make them significantly stronger and more effective at lifting heavy objects.

138. What did Alessandro Volta believe was the source of electricity in Galvani's experiment?

Ans :

Alessandro Volta had a different idea and believed that the electricity came from the combination of two different metals, not from the frog's leg itself.

139. Besides current, what other factors affect the heat generated in a wire?

Ans :

The amount of heat generated in a wire also depends on the material, thickness, and length of the wire, and the duration of current flow.

140. How does the Earth's magnetic field protect life?

Ans :

The Earth's magnetic field acts as a protective shield, effectively blocking many harmful particles that come from space, thereby helping to protect life on Earth.

141. Why are dry cells called 'dry'?

Ans :

They are called 'dry' because the electrolyte used inside them is not a liquid but is instead a thick, moist paste, making them more convenient.

SHORT ANSWER QUESTIONS

142. Describe what happens to a compass needle in proximity to a current-carrying wire.

Ans :

When an electric current flows through a wire, it generates a magnetic field around it. A compass needle, being a tiny magnet, gets deflected from its original direction when placed within this field. This deflection indicates the presence and magnetic effect of the current. When the current is turned off, the magnetic field disappears, and the needle returns to its original position.

143. Explain the basic construction and working principle of a simple electromagnet.

Ans :

A simple electromagnet can be made by following these steps:

- Tightly wrap an insulated wire around an iron nail to form a coil.
- Connect the ends of the wire to an electric cell or battery.
- When current flows, the coil creates a magnetic field, turning the nail into a magnet that can attract iron clips.
- Disconnecting the cell stops the current, and the nail loses its magnetism.

144. Compare the properties of a permanent magnet and an electromagnet.

Ans :

A permanent magnet retains its magnetism indefinitely, while an electromagnet is magnetic only when current flows through its coil. The strength of an electromagnet can be altered by changing the current or the number of coil turns, and its polarity can be reversed by changing the current's direction. A permanent magnet's strength and polarity are fixed, making electromagnets more versatile for certain applications.

145. The table below matches electrical components with their properties or principles. Explain the reasoning behind matching the 'Electric Iron' with 'heating effect' and the 'Electromagnet' with 'magnetic effect'.

	Column A		**Column B**
(i)	Voltaic cell	(a)	Generates electricity
(ii)	Electric iron	(b)	Works on heating effect of electric current
(iii)	Nichrome wire	(c)	Best suited for electric heater
(iv)	Electromagnet	(d)	Works on magnetic effect of electric current

Ans :

An electric iron is matched with the heating effect because its internal coil has high resistance, converting electricity into heat to press clothes. An electromagnet is matched with the magnetic effect as it is a temporary magnet created by passing current through a coil, used to attract magnetic materials.

Click Here to Buy book on Amazon

146. Describe how a lifting electromagnet is used in a scrap yard.

Ans :

Lifting electromagnets are used for the following purposes in scrap yards:

- They are attached to cranes to move, lift, and sort heavy iron and steel items efficiently.
- The crane operator controls the magnet by switching the electric current on to lift objects.
- To release the load at the desired location, the operator simply switches the current off, causing the magnetic field to vanish.

147. What causes the heating effect of electric current in a conductor?

Ans :

When electric current flows through any conductor, it encounters some opposition, or resistance, to its flow. Different materials offer different levels of resistance; for instance, nichrome offers more resistance than copper. This resistance to the flow of electrons causes some of the electrical energy to be converted directly into heat energy, thus warming the conductor through the heating effect.

148. Explain how an incandescent lamp produces light using the heating effect.

Ans :

An incandescent lamp works on the principle of the heating effect of electric current. It contains a thin wire called a filament. When electric current passes through this filament, the filament gets heated to a very high temperature due to its resistance. This intense heat causes the filament to glow brightly, producing light, which is why the lamp sometimes feels warm to the touch.

149. Describe the main components and function of a Voltaic cell.

Ans :

A Voltaic cell generates electricity through chemical reactions. Its main components are:

- Two electrodes, which are plates made of different metal materials.
- An electrolyte, which is a liquid such as a weak acid or salt solution.
- When connected in a circuit, a chemical reaction between the electrodes and electrolyte produces electricity, causing current to flow from the positive to the negative terminal.

NODIA

150. How can one construct a simple electric cell using lemons?

Ans :

A simple cell can be made using five or six juicy lemons. First, insert a copper wire and an iron nail into each lemon, keeping them apart. Then, join the copper wire of one lemon to the iron nail of the next, creating a series connection. Finally, connect an LED between the first copper wire and the last iron nail.

151. Explain the internal structure of a common dry cell.

Ans :

A dry cell consists of an outer zinc container that acts as the negative terminal. At the center is a carbon rod covered with a metal cap, which functions as the positive terminal. The space between the carbon rod and the zinc container is filled with a paste-like electrolyte. This "dry" paste is what gives the cell its name and portability.

152. Discuss the importance and limitations of rechargeable batteries in modern devices.

Ans :

Rechargeable batteries are vital for modern devices like phones and laptops because they can be reused multiple times, saving money and reducing waste. However, they have limitations:

- They do not last forever and slowly wear out with repeated charging cycles.
- They rely on special metals like lithium and cobalt, which are mined in limited parts of the world, raising supply and environmental concerns.

153. A student creates three setups for a lemon battery as shown in the table. Based on the list of effective metal pairs in your textbook, which setup will not work to light the LED and why?

Setup	Electrode 1	Electrode 2	Electrolyte
A	Iron Nail	Copper Strip	Lemon Juice
B	Zinc Strip	Copper Strip	Lemon Juice
C	Copper Strip	Copper Wire	Lemon Juice

Ans :

Setup C will not work. A Voltaic cell requires two different metals as electrodes to create a potential difference and generate current through a chemical reaction with the electrolyte. Since Setup C uses the same metal (copper) for both electrodes, no electricity will be produced to light the LED.

154. What was Hans Christian Oersted's accidental discovery and its significance?

Ans :

During a university demonstration, Hans Christian Oersted accidentally noticed that the needle of a magnetic compass deflected whenever a nearby electrical circuit was closed or opened. He investigated this and confirmed that an electric current produces a magnetic field. This discovery was significant because it established the fundamental link between the phenomena of electricity and magnetism for the first time.

155. Why is nichrome wire preferred for heating elements in appliances?

Ans :

Nichrome wire is commonly used in heating elements for several key reasons:

- It offers a much higher resistance to electric current compared to conductors like copper.
- This high resistance causes it to convert electrical energy into heat energy very efficiently.
- As a result, for a given amount of current, it generates significantly more heat, making it ideal for appliances like heaters and stoves.

156. What are some industrial applications of the heating effect of current?

Ans :

Beyond household use, the heating effect of electric current has several industrial applications. A notable example is in steel manufacturing industries, where a specially designed high-temperature electric furnace is used. This furnace uses electric current to produce immense heat, which is then used to melt and recycle large quantities of scrap steel, efficiently converting it into usable steel.

157. Explain the key differences between a dry cell and a rechargeable battery.

Ans :

The main differences lie in their reusability and chemistry:

- A dry cell is a single-use cell; once its chemicals are used up, it must be disposed of.
- A rechargeable battery can be recharged and reused multiple times by reversing the chemical reaction.
- This makes rechargeable batteries more environmentally friendly and cost-effective over time, though they also eventually wear out after many cycles.

158. Why does the Earth behave like a giant magnet?

Ans :

The Earth behaves like a magnet due to processes occurring deep within its core. The movement of liquid iron in the outer core generates massive electric currents. According to the principles of electromagnetism, these large-scale electric currents produce a powerful and extensive magnetic field that surrounds the entire planet, making it act like a giant, albeit complex, magnet.

159. How can you determine the polarity of an electromagnet using a compass?

Ans :

To determine an electromagnet's polarity, bring a magnetic compass near one of its ends, say end A. Since unlike poles attract, if the north pole of the compass is attracted to end A, then end A is the south pole of the electromagnet. This procedure can then be repeated at the other end to confirm its opposite polarity.

NODIA

160. The table shows results from an experiment to test an electromagnet's strength. Analyse the data and explain the relationship between the number of cells, coil turns, and the electromagnet's strength.

Setup	No. of Cells	No. of Turns	No. of Paper Clips Lifted
1	1	50	5
2	2	50	11
3	1	100	9

Ans :

The strength of an electromagnet is directly proportional to the electric current and the number of turns in its coil. As shown in the table, increasing the number of cells (current) or the number of coil turns increases the number of paper clips the electromagnet can lift.

161. Explain how you could make an electromagnet stronger without using more batteries.

Ans :

To make an electromagnet stronger without increasing the current from more batteries, you can increase the number of turns in the coil. Wrapping the insulated wire more tightly with a greater number of loops around the iron core concentrates the magnetic field. This increased number of turns directly contributes to creating a stronger magnet, capable of attracting more objects.

162. Describe the key events that led to the invention of the first battery.

Ans :

The invention of the battery involved these key scientific observations:

- Luigi Galvani noticed a dead frog's leg twitched when touched with two different metals, copper and iron.
- He believed the electricity came from the frog, but Alessandro Volta disagreed.
- Volta tested his own idea by replacing the frog's leg with saltwater-soaked paper and still detected an electric current, proving the metals and liquid were the source.

Download INDIA's Best Study app NODIA

163. What are the safety risks associated with the heating effect of current?

Ans :

While useful, the heating effect of electric current can pose safety risks. Overheating in appliances can cause damage to plastic parts of plugs and sockets, which may melt. In more serious cases, this overheating can even lead to fires. To minimize these risks, safety devices are installed in household circuits, and it's crucial to use appropriately rated wiring.

164. How do scientists plan to improve future rechargeable batteries?

Ans :

Scientists are working on next-generation batteries called solid-state batteries. These future batteries will have key improvements:

- They will replace the liquid or paste-like electrolytes with solid materials, making them much safer.
- This new technology aims to create batteries that can charge faster and last significantly longer.
- These improvements are crucial as the world shifts toward more environmentally friendly power sources.

165. Why does a coil of wire behave like a magnet when current flows?

Ans :

When current flows through a wire, it creates a magnetic field around it. Winding the wire into a coil concentrates this magnetic effect. Each turn of the coil contributes to the overall magnetic field, making the entire coil act like a single magnet with a north and a south pole, strong enough to deflect a compass needle.

166. The table lists different household appliances. What is the common scientific principle behind their operation, and what essential component, made of a material like nichrome, do they all contain?

Appliance
Room Heater
Electric Kettle
Hair Dryer
Electric Stove

Ans :

All these appliances work on the heating effect of electric current, where electrical energy is converted into heat. They all contain an essential component called a 'heating element', which is a coil made of a high-resistance material like nichrome that gets hot when current passes through it.

167. If you drop an electromagnet, why do the paper clips fall off?

Ans :

The paper clips fall off because an electromagnet's magnetic property is temporary. The magnetic field is only produced when electric current flows through the coil wrapped around the iron core. When the circuit is opened, such as by dropping and disconnecting it from the battery, the current stops, the magnetic field vanishes, and the electromagnet can no longer hold the clips.

Downloaded from www.pdf.tube

168. Explain the importance of an iron core in most practical electromagnets.

Ans :

Most practical electromagnets include an iron core for a significant reason:

- An iron core dramatically increases the strength of the magnetic field produced by the coil.
- When current flows, the iron becomes strongly magnetized, adding its own magnetic field to that of the coil.
- This makes the electromagnet powerful enough for applications like lifting heavy scrap metal, which would not be possible with an air-cored coil alone.

169. What evidence shows that electricity and magnetism are linked?

Ans :

The evidence of the link between electricity and magnetism. The primary evidence is that a current-carrying wire deflects a nearby magnetic compass needle. This shows that electricity (the current) produces magnetism (a magnetic field). This interaction forms the basis of electromagnets and many other devices, demonstrating the deep and useful connection between these two forces.

170. Compare the behavior of a compass needle near a coil with and without current.

Ans :

When there is no current flowing through the coil, it has no magnetic effect, and a nearby compass needle will simply align with the Earth's magnetic field, pointing north-south. However, when current is passed through the coil, it generates its own magnetic field, causing the compass needle to deflect and point towards one of the coil's newly formed magnetic poles.

171. Why are single-use dry cells being replaced by rechargeable batteries?

Ans :

Dry cells are single-use, meaning they must be disposed of after their chemical energy is depleted. In contrast, rechargeable batteries offer key advantages:

- They can be reused multiple times, preventing waste and making them more environmentally friendly.
- Over the long term, they save money since new batteries do not need to be purchased repeatedly.
- This makes them more suitable for high-use devices like phones and laptops.

NODIA

172. What is the consequence of leaving a lifting electromagnet switched on for too long?

Ans :

Leaving a lifting electromagnet on for an extended period would cause the electric cell or battery powering it to weaken quickly. As the battery drains, the current flowing through the coil decreases. This reduces the strength of the magnetic field, and eventually, the electromagnet will no longer be strong enough to pick up or hold onto heavy iron objects.

173. Explain why a current-carrying wire can affect a compass through non-magnetic materials.

Ans :

The magnetic effect of a current-carrying wire can act through non-magnetic materials like cardboard or air. This is because the magnetic field generated by the current extends into the space around the wire. As long as the compass is within this field, its needle will be deflected, regardless of any non-magnetic substance placed between the wire and the compass.

174. What are the three factors that can be changed to alter an electromagnet's strength?

Ans :

The strength of an electromagnet can be changed by manipulating the following three factors:

- The amount of electric current flowing through the coil; more current results in a stronger magnet.
- The number of turns of the wire in the coil; more turns create a stronger magnetic field.
- The presence of an iron core; inserting an iron core significantly enhances the magnetic strength compared to an air-cored coil.

175. How is the industrial melting of steel similar to a household electric stove?

Ans :

Both the industrial melting of steel and a household electric stove operate on the same fundamental principle : the heating effect of electric current. In both cases, electric current is passed through

a material with high resistance. This resistance converts electrical energy into a large amount of heat. The stove uses this heat for cooking, while the furnace uses it to melt steel.

LONG ANSWER QUESTIONS

176. Describe the experiment that demonstrates the magnetic effect of an electric current.

Ans :

The experiment to demonstrate the magnetic effect of electric current involves these key steps:

- An electric circuit is assembled using a cell, a switch, and connecting wires.
- A portion of a wire is stretched between two points, and a magnetic compass is placed directly beneath it.
- Initially, with the switch off, the compass needle points north-south.
- When the switch is turned on, allowing current to flow, the compass needle immediately deflects from its original position.
- Turning the switch off stops the current, and the needle returns to its original direction, proving the current created a temporary magnetic field.

177. Explain in detail how you can vary and test the strength of a homemade electromagnet.

Ans :

The strength of a homemade electromagnet can be varied and tested using the following methods:

- **Varying Current** : First, connect the electromagnet's coil to a single cell and count how many paper clips it can lift. Then, connect it to a battery of two cells, which provides a larger current, and observe that it can lift more clips, demonstrating that higher current increases strength.
- **Varying Coil Turns** : Create two coils with different numbers of turns (e.g., 25 vs. 50) but use the same cell. The coil with more turns will be able to attract more clips, proving that increasing the number of turns strengthens the magnet.

178. Describe the experiment to investigate the heating effect of current using nichrome wire.

Ans :

The experiment to show the heating effect of current is set up as follows:

- A circuit is made with a nichrome wire stretched between two nails on a cardboard piece, connected to a cell and a switch.
- Before starting, the nichrome wire is touched and feels cool.
- The switch is moved to the 'ON' position for about 30 seconds, allowing current to flow through the wire.
- After moving the switch back to 'OFF', the nichrome wire is momentarily touched again.
- It will now feel warm, demonstrating that the flow of electric current has heated the wire due to its electrical resistance.

179. Compare and contrast the structure and operation of Voltaic cells and dry cells.

Ans :

Voltaic and dry cells both generate electricity via chemical reactions, but they differ significantly in structure and practicality.

- **Structure** : A Voltaic cell uses two different metal plates (electrodes) partially dipped in a liquid electrolyte. In contrast, a dry cell uses a zinc container as the negative terminal, a central carbon rod as the positive terminal, and a moist, thick paste as its electrolyte.
- **Operation** : Both produce current from chemical reactions, but the liquid electrolyte in a Voltaic cell makes it less portable and convenient for everyday use compared to the sealed, paste-based dry cell.

180. Elaborate on the different types of batteries discussed and their real-world applications.

Ans :

Three main types of electric cells and batteries, each with specific applications:

- **Voltaic Cells** : These early cells use liquid electrolytes and are not convenient for portable use but demonstrate the basic principle of generating electricity from chemical reactions.
- **Dry Cells** : These are single-use batteries with a paste electrolyte, making them portable. They are widely used in devices like torches, clocks, and remote controls.
- **Rechargeable Batteries** : These, like Li-ion batteries, can be reused multiple times. They are essential for modern electronics such as mobile phones, laptops, cameras, and

Click Here to Buy book on Amazon

electric vehicles, offering sustainability and convenience.

181. A student builds two electromagnets. One has 50 turns around a plastic rod, and the other has 100 turns around an identical iron rod. Predict which is stronger and why.

Ans :

The electromagnet with 100 turns around the iron rod will be significantly stronger due to two combined factors:

- **Number of Turns** : The magnetic field strength of an electromagnet is directly related to the number of turns in its coil. The second magnet has twice as many turns (100 vs. 50), which alone makes it stronger.
- **Core Material** : Most importantly, the second magnet uses an iron rod as its core. Iron is a ferromagnetic material that becomes strongly magnetized itself, greatly amplifying the magnetic field of the coil. A plastic rod provides no such enhancement, making the iron-core magnet vastly superior.

182. Explain why a circuit with a nichrome wire and a two-cell battery would generate the most heat compared to other combinations with copper wire and single cells.

Ans :

This circuit would generate the most heat due to the combination of high resistance and high current, which are the primary factors in the heating effect.

- **Material Resistance** : Nichrome wire has a much higher electrical resistance compared to copper wire. This inherent property means it converts more electrical energy into heat for the same amount of current.
- **Current Magnitude** : Using a two-cell battery provides a larger electric current than a single cell. The amount of heat generated is directly dependent on the magnitude of this current.
- **Combined Effect** : Therefore, the combination of high resistance (nichrome) and high current (two cells) will produce the maximum heating effect.

183. Argue why the discovery of the link between electricity and magnetism was a crucial turning point for technology.

Ans :

NODIA

The discovery of the link between electricity and magnetism was a monumental turning point for technology for several key reasons:

- **New Possibilities** : It revealed that one force could be used to create another, opening up a new field of science and engineering.
- **Invention of Electromagnets** : This link directly led to the invention of the electromagnet, a controllable magnet whose strength and polarity can be adjusted.
- **Foundation for Modern Devices** : Electromagnets became the foundational component for countless technologies we rely on today, including electric motors, fans, loudspeakers, and industrial lifting equipment, fundamentally transforming modern life and industry.

184. Imagine you have a coil of wire, a cell, and some paper clips. Without an iron nail, how could you still demonstrate the magnetic effect, and why would it be weaker?

Ans :

Even without an iron nail, the magnetic effect can be demonstrated by following these steps:

- First, connect the coil of wire to the cell to allow current to flow.
- The current flowing through the cylindrical coil will cause it to behave like a magnet on its own, albeit a weaker one.
- This can be proven by bringing the coil near very small or lightweight iron/steel paper clips; it should be able to attract a few.
- It is weaker because it lacks an iron core. An iron core becomes strongly magnetized and adds its own field, greatly amplifying the overall magnetic strength.

185. Discuss the societal and environmental implications of shifting from single-use dry cells to rechargeable lithium-ion batteries.

Ans :

The shift from single-use to rechargeable batteries has significant societal and environmental implications.

- **Societal Benefits** : Rechargeable batteries are more economical for consumers over time and power essential modern devices like smartphones and laptops, which are integral to communication and work.
- **Environmental Benefits** : They reduce waste since fewer batteries need to be disposed of.

- **Environmental Challenges** : However, they rely on mining special metals like lithium and cobalt, which can have negative environmental impacts and create geopolitical competition for resources. Proper recycling of these batteries is crucial to reclaim valuable materials and prevent pollution from hazardous components.

CASE BASED QUESTIONS

186. A student sets up a simple circuit with a wire stretched over a magnetic compass. When she closes the switch, allowing current to flow, she is surprised to see the compass needle deflect. When she opens the switch, the needle returns to its original north-south position. This demonstrates the magnetic effect of electric current discovered by Hans Christian Oersted.

Questions:

1. What happens to the compass needle when the electric current is stopped?
2. The compass needle is a tiny magnet. What does its deflection indicate about the current-carrying wire?
3. If the student used a more powerful battery (e.g., two cells instead of one), how would the needle's deflection change? Explain why.

Ans :

1. When the current stops, the compass needle returns to its original direction.
2. The deflection indicates that the current-carrying wire is producing a magnetic field, which has a magnetic effect on the compass needle.
3. The deflection would be greater. A battery with more cells provides a larger current, which creates a stronger magnetic field, causing a more significant deflection.

187. A student creates an electromagnet by tightly wrapping an insulated wire around an iron nail and connecting the ends to a cell. When the circuit is closed, the nail successfully picks up several iron paper clips. However, the moment she disconnects the wire from the cell, the paper clips immediately fall off, demonstrating the temporary nature of the electromagnet.

Questions:

1. What is a current-carrying coil that behaves as a magnet called?
2. Why did the paper clips fall when the student disconnected the wire from the cell?
3. What two changes could the student make to her setup to lift more paper clips?

Ans :

1. It is called an electromagnet.
2. The clips fell because when the current stopped, the magnetic effect disappeared, and the coil lost its magnetism.
3. She could increase the strength of the electromagnet by using a battery with more cells (to increase the current) or by increasing the number of turns of the wire in the coil.

188. In an experiment, a student connects a short piece of nichrome wire to a cell using a switch. Before closing the switch, the wire is at room temperature. After letting the current flow for 30 seconds, she momentarily touches the wire and feels that it has become warm. This demonstrates the heating effect of electric current.

Questions:

1. What is the phenomenon called when a conductor gets heated by an electric current?
2. Why does the nichrome wire heat up when current passes through it?
3. If the student replaced the nichrome wire with a copper wire of the same size, would it get as hot? Why or why not?

Ans :

1. This is known as the heating effect of electric current.
2. The wire heats up because it offers resistance to the flow of current, which causes some electrical energy to be converted into heat energy.
3. No, it would not get as hot. The nichrome wire offers higher resistance than a copper wire of the same size and the amount of heat generated depends on the material.

189. To build a simple Voltaic cell, a student inserts a copper strip and an iron nail into a juicy lemon. She connects several such lemon cells in series. Finally, she connects the copper strip of the first lemon and the iron nail of the last lemon to an LED. The LED glows, proving that a chemical reaction is generating electricity.

Downloaded from www.pdf.tube

Questions:

1. In this lemon cell, what acts as the electrolyte?
2. The copper strip and iron nail are the two different metal plates in this cell. What are these plates called?
3. If the LED does not glow at first, what is the first troubleshooting step the student should take ?

Ans :

1. The lemon juice acts as the electrolyte.
2. The plates are called electrodes.
3. She should reverse the connections of the LED, as current can pass through an LED only when its positive and negative terminals are connected correctly to the cell's terminals.

190. At a scrapyard, a large crane uses a powerful lifting electromagnet instead of a hook. The crane operator lowers the electromagnet over a pile of scrap metal and switches the current ON. A large amount of iron and steel scrap sticks to it. The crane then moves the scrap and the operator switches the current OFF, releasing the metal.

Questions:

1. What device does the crane use to lift metal objects?
2. How does the crane operator release the lifted iron and steel objects?
3. Why is an electromagnet more suitable for this job than a permanent magnet of the same lifting power?

Ans :

1. The crane uses a strong lifting electromagnet.
2. The operator switches the electric current OFF, causing the magnetic field to disappear and the objects to be released.
3. An electromagnet is more suitable because its magnetic force can be switched on and off by the operator, allowing it to easily pick up and release materials, which is not possible with a permanent magnet.

191. A student builds an electromagnet with an iron core. To identify its poles, she brings a magnetic compass near one end, which she labels 'A'. When current flows, the North pole of the compass needle is attracted to end A. She concludes that end A must be the South pole, based on the principle that unlike poles attract each other.

Questions:

1. Like a bar magnet, what two poles does an electromagnet have?
2. In the experiment, what did the student observe that allowed her to identify end A as a South pole?
3. What could the student do to reverse the polarity, making end A the North pole?

Ans :

1. An electromagnet has a North pole and a South pole.
2. She observed that the North pole of the magnetic compass was attracted towards end A.
3. She could reverse the polarity by changing the direction of the current, for example, by reversing the connections to the battery terminals.

NODIA

192. During a cold day, a family uses an electric room heater. They can see the heating element inside, a coil of wire, glowing red hot. This appliance works on the heating effect of electric current. The element, likely made of a material like nichrome, has high resistance, which causes it to generate a large amount of heat when electricity passes through it.

Questions:

1. What is the coil of wire inside a heating appliance called?
2. On what principle of electricity does an electric heater work?
3. Why are materials with high resistance, like nichrome, used for heating elements instead of materials with low resistance like copper?

Ans :

1. The coil of wire is called a heating element.
2. It works on the heating effect of electric current.
3. Materials with high resistance offer more opposition to the flow of current, which causes more electrical energy to be converted into heat, making them effective for heating appliances.

193. A student is trying to power a small toy with a dry cell, but it doesn't work. His teacher explains that the cell is likely "dead." Inside the cell, a chemical reaction between the electrodes and the electrolyte paste generates electricity. Over time, these chemicals get used up, the reaction stops, and the cell can no longer supply any more electricity.

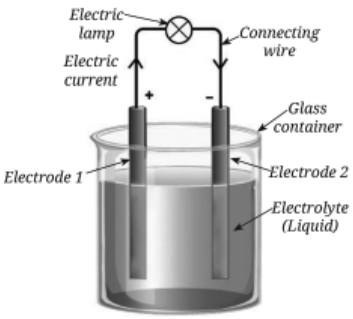
Questions:

1. Is the electrolyte in a dry cell a liquid or a moist paste?
2. What causes a dry cell to eventually stop working or become "dead"?
3. A dry cell is a single-use cell. What is the name for batteries that can be used multiple times?

Ans :

1. The electrolyte in a dry cell is a thick, moist paste.
2. A dry cell becomes dead because the chemicals inside it get used up over time, and the chemical reaction that produces electricity stops.
3. Batteries that can be used multiple times are called rechargeable batteries.

194. A simple Voltaic cell is shown below. It consists of two different metal plates, called electrodes, partially dipped in a liquid called an electrolyte, like a weak acid or salt solution. When the electrodes are connected in a circuit, a chemical reaction between the plates and the electrolyte produces an electric current that can light a small lamp.



Simple representation of a Voltaic cell

Questions:

1. What are the three main components of a Voltaic cell?
2. What process inside the Voltaic cell is responsible for generating electricity?
3. Why is it necessary for the two electrodes to be made of different materials?

Ans :

1. The three main components are two different metal plates (electrodes), a liquid (electrolyte), and a container.
2. A chemical reaction between the metal plates and the electrolyte produces electricity.
3. The cell contains two metal plates made of different materials, and the invention of the battery relied on this combination of different metals and a liquid to generate a current.

195. A student notices that her new phone's battery lasts all day, but her older phone needs to be charged more often. Her father explains that the phone uses a rechargeable lithium-ion battery. These batteries can be recharged and reused many times, but they slowly wear out after repeated charging cycles, which is why older batteries don't hold their charge as well.

Questions:

1. What is the main advantage of a rechargeable battery over a single-use dry cell?
2. What does it mean when an older phone battery "wears out"?
3. Why is the development of better rechargeable batteries important as the world moves toward using more electric vehicles?

Ans :

1. The main advantage is that it can be recharged and reused multiple times, which prevents wastage and saves money.
2. It means that after being charged and used many times, the battery's ability to store electricity diminishes, and it can no longer hold its charge for as long.
3. Improved rechargeable batteries are important for electric vehicles because future batteries could be safer, charge faster, and last longer, making electric transportation more practical and efficient.

196. An electrician warns a homeowner about the dangers of overloading a circuit. He explains that if too much current flows through a wire, the heating effect can cause it to overheat. This can damage appliances, melt the plastic on plugs and sockets, and in worst-case scenarios, even lead to fires. Safety devices are installed in circuits to prevent such incidents.

Questions:

1. What phenomenon causes a wire to get hot when current flows through it?
2. Besides being a fire hazard, what other damage can overheating cause in a circuit?
3. The amount of heat generated depends on the magnitude of the current. How does this explain why overloading a circuit is dangerous?

Click Here to Buy book on Amazon

Ans :

1. The heating effect of electric current causes the wire to get hot.
2. Overheating can cause damage to plugs and sockets, where plastic parts may melt.
3. Overloading a circuit means a very large current is flowing. Since more current generates more heat, this can cause the wires to heat up to dangerous levels, creating a fire risk.

197. A student experiments with an electromagnet made from a coil of wire around an iron nail. First, she connects it to a single cell and observes it picks up 5 paper clips. Next, she connects it to a battery of two cells and finds it can now pick up 12 paper clips, showing that the electromagnet became stronger.

Questions:

1. What happens to the strength of an electromagnet when the current flowing through it increases?
2. In this experiment, how did the student increase the current flowing through the coil?
3. Besides increasing the current, what is another way the student could make her electromagnet stronger without adding more cells?

Ans :

1. The strength of the electromagnet increases, and it creates a stronger magnetic field.
2. She increased the current by using a battery with two cells instead of a single cell.
3. She could increase the number of turns of the wire in the coil.

198. An electric iron contains a heating element, which is a coil made of a material with high resistance. When the iron is plugged in, electric current flows through this element. Due to the high resistance, a significant amount of electrical energy is converted into heat, which warms up the flat base of the iron, making it effective for pressing clothes.

Questions:

1. What component inside an electric iron gets hot when current flows through it?
2. Why does this component generate heat?
3. Name two other household appliances that work on the same principle as an electric iron.

Ans :

1. The heating element inside the iron gets hot.
2. It generates heat because the material offers resistance to the flow of current, converting electrical energy into heat energy.
3. Two other appliances are the electric room heater and the hair dryer.

199. A science documentary explains that Earth behaves like a giant magnet. This is because the movement of liquid iron deep inside the Earth's core creates electric currents, which in turn generate a massive magnetic field. This field is not only used by migratory birds for navigation but also acts as a protective shield against harmful particles from space.

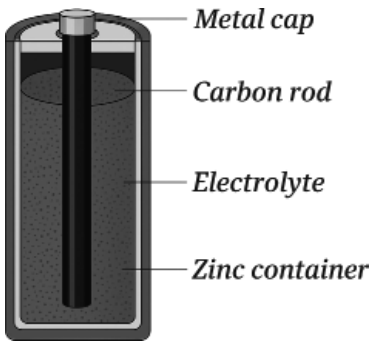
Questions:

1. What inside the Earth's core generates its magnetic field?
2. What phenomenon links the electric currents in the core to the magnetic field?
3. How does the Earth's magnetic field help protect life on the planet?

Ans :

1. The movement of liquid iron in the core creates electric currents, which generate the magnetic field.
2. The phenomenon is the magnetic effect of electric current, where an electric current produces a magnetic field.
3. The Earth's magnetic field acts as a shield, blocking harmful particles from space and helping protect life on Earth.

200. A diagram of a dry cell shows a central carbon rod with a metal cap, which acts as the positive terminal. This rod is surrounded by a thick, moist paste that serves as the electrolyte. The entire assembly is housed in a zinc container, which itself acts as the negative terminal. This compact, "dry" design makes it convenient for everyday use in portable devices.



Its internal structure

Downloaded from www.pdf.tube

Questions:

1. In a dry cell, what material acts as the positive terminal?
2. Why is this type of cell called a "dry cell"?
3. What is the function of the zinc container, apart from holding the components together?

Ans :

1. A carbon rod covered with a metal cap acts as the positive terminal.
2. It is called a dry cell because the electrolyte is not a liquid but a thick, moist paste.
3. The zinc container also acts as the negative terminal of the cell.

****

NODIA

CHAPTER 5

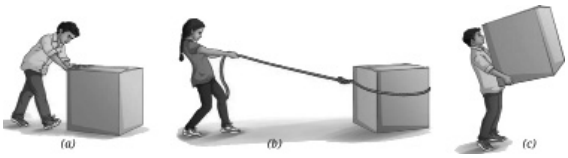
EXPLORING FORCES

SUMMARY

1. UNDERSTANDING FORCE

1.1 Definition of Force

In science, a force is defined as a push or a pull applied to an object. A force occurs as a result of an interaction between at least two objects.
The SI unit of force is the newton, and its symbol is N.



Moving a box in different ways (a) Pushing ; (b) Pulling ; (c) Lifting (pulling up), and carrying

1.2 The Effects of Force

Applying a force to an object can cause several changes:

1. Make a stationary object move.
2. Change the speed of a moving object.
3. Change the direction of a moving object's motion.
4. Change the shape of an object.

2. TYPES OF FORCES

Forces are broadly divided into two categories : contact forces and non-contact forces.

2.1 Contact Forces

Contact forces act only when objects are in physical contact with each other.

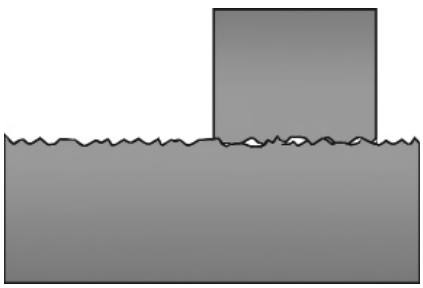
2.1.1 Muscular Force

1. This is the force created by the action of muscles in the body.
2. It is used for all physical activities like walking, lifting, and pushing.
3. Animals also use muscular force for movement , and it is essential for internal body processes like digestion and blood circulation.

Use of muscular force by living beings

2.1.2 Frictional Force (Friction)

Friction is the force that comes into play when an object moves or attempts to move over another surface. It always acts in the direction opposite to the motion, causing moving objects to slow down and eventually stop. Friction is caused by tiny irregularities on the two surfaces in contact locking into each other. The force of friction is greater on rough surfaces compared to smooth ones.



Friction between two surfaces due to irregularities

2.2 Non-Contact Forces

Non-contact forces can act on objects from a distance, without any physical touch.

Click Here to Buy book on Amazon

2.2.1 Magnetic Force

This is the force exerted by a magnet on another magnet or on a magnetic material. It is a non-contact force as it can act from a distance. Like magnetic poles repel each other, while unlike poles attract.

Force between two ring magnets

2.2.2 Electrostatic Force

This is the force exerted by an electrically charged object on another charged or uncharged object. Objects become charged by rubbing them, which builds up static charges. There are two types of charges : positive and negative. Like charges repel each other, while unlike charges attract.

Charged plastic scale attracting small paper pieces

2.2.3 Gravitational Force (Gravity)

1. This is the force with which the Earth pulls all objects towards its center.
2. It is a non-contact force and is always attractive.
3. It is the reason why objects thrown upwards fall back down to the ground.

3. GRAVITATIONAL FORCE IN DETAIL

3.1 Weight : The Force of Gravity

The weight of an object is the measure of the gravitational force pulling it towards the Earth. Since weight is a force, its SI unit is the newton (N).The Earth pulls on different objects with different forces, meaning different objects have different weights.

3.2 Measuring Weight

A spring balance is a simple device used to measure the weight of an object. It consists of a spring that stretches when an object is hung from it. The amount of stretch indicates the object's weight.

NODIA Download INDIA's Best Study app NODIA

3.3 Mass vs. Weight

1. Mass is the amount of matter an object contains. Its value is constant and does not change with location. The SI unit is the kilogram (kg).
2. Weight is the force of gravity on that mass. Its value can change depending on the strength of the gravitational pull (e.g., an object's weight on the Moon is less than on Earth).

4. FORCES IN LIQUIDS

4.1 Buoyant Force (Upthrust)

When an object is placed in a liquid, the liquid exerts an upward force on it. This upward force is called upthrust or buoyant force.

Plastic bottle in water

4.2 Why Objects Float or Sink

Every object in a liquid is acted upon by two forces the downward pull of gravity and the upward push of the buoyant force.

1. An object sinks if the gravitational force (its weight) is greater than the buoyant force.
2. An object floats if the buoyant force is equal to the gravitational force.

Download INDIA's Best Study app NODIA

NCERT EXERCISE

1. Match items in Column A (Type of force) with the items in Column B. (Example)

	Column A		**Column B**
(i)	Muscular force	(a)	A cricket ball stopping on its own just before touching the boundary line
(ii)	Magnetic force	(b)	A child lifting a school bag
(iii)	Frictional force	(c)	A fruit falling from a tree
(iv)	Gravitational force	(d)	Balloon rubbed on woollen cloth attracting hair strands
(v)	Electrostatic force	(e)	A compass needle pointing North

Ans :

(i) Muscular force : (b) A child lifting a school bag
(ii) Magnetic force : (e) A compass needle pointing North
(iii) Frictional force : (a) A cricket ball stopping on its own just before touching the boundary line
(iv) Gravitational force : (c) A fruit falling from a tree
(v) Electrostatic force : (d) Balloon rubbed on woollen cloth attracting hair strands

2. State whether the following statements are True or False.

(i) A force is always required to change the speed of motion of an object.
(ii) Due to friction, the speed of the ball rolling on a flat ground increases.
(iii) There is no force between two charged objects placed at a small distance apart.

Ans :

(i) **True :** A force is essential to change the speed of a moving object.
(ii) **False :** The force of friction always acts in a direction opposite to the motion of an object, causing its speed to decrease gradually until it stops.
(iii) **False :** An electrostatic force exists between two charged objects, which is a non-contact force that acts even when the objects are at a distance.

3. Two balloons rubbed with a woollen cloth are brought near each other. What would happen and why?

Ans :

When two balloons rubbed with a woollen cloth are brought near each other, they will move away from, or repel, each other. This happens because when both balloons are rubbed with the same material (woollen cloth), they acquire a similar electrical charge. Since similar charges repel each other, the balloons push each other away.

4. When you drop a coin in a glass of water, it sinks, but when you place a bigger wooden block in water, it floats. Explain.

Ans :

When an object is placed in water, two forces act on it : the downward gravitational force (its weight) and the upward buoyant force from the water.

1. A coin sinks because the downward gravitational force acting on it is greater than the upward buoyant force applied by the water.
2. A wooden block floats because the upward buoyant force applied by the water is equal to the downward gravitational force acting on the block.

5. If a ball is thrown upwards, it slows down, stops momentarily, and then falls back to the ground. Name the forces acting on the ball and specify their directions.

(i) During its upward motion
(ii) During its downward motion
(iii) At its topmost position

Ans :

(i) During its upward motion : Two forces act on the ball:
- Gravitational force, acting downwards towards the Earth.
- Force of friction from the air, also acting downwards, opposing the upward motion.

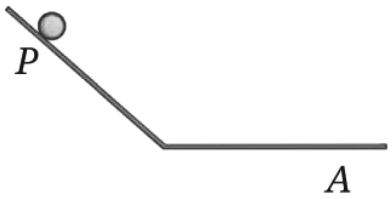
(ii) During its downward motion : Two forces act on the ball:
- Gravitational force, acting downwards towards the Earth.

Downloaded from www.pdf.tube

- Force of friction from the air, acting upwards, opposing the downward motion.

(iii) At its topmost position : Even when the ball stops momentarily, the gravitational force continues to act on it, pulling it downwards towards the Earth.

6. A ball is released from the point P and moves along an inclined plane and then along a horizontal surface as shown in the Figure 5.16. It comes to stop at the point A on the horizontal surface. Think of a way so that when the ball is released from the same point P, it stops (i) before the point A (ii) after crossing the point A.



Ans :

The ball stops due to the force of friction between its surface and the horizontal surface.

(i) To make the ball stop before point A : We need to increase the force of friction. This can be achieved by making the horizontal surface rougher, for instance, by spreading a layer of sand or placing a cloth on it.

(ii) To make the ball stop after crossing point A : We need to decrease the force of friction. This can be achieved by making the horizontal surface smoother. Rough surfaces have greater friction than smooth surfaces.

7. Why do we sometimes slip on smooth surfaces like ice or polished floors? Explain.

Ans :

Friction arises from the interlocking of irregularities between two surfaces in contact. Smooth surfaces like ice or polished floors have very few irregularities. This reduces the force of friction between our shoes and the floor, making it difficult to get a proper grip and causing us to slip.

8. Is any force being applied to an object in a non-uniform motion?

Ans :

Yes, a force is being applied to an object in non-uniform motion. Non-uniform motion involves a change in the object's speed, direction of motion, or both. A change in either speed or direction cannot happen without the action of a force.

NODIA

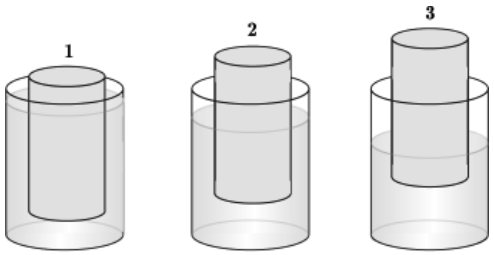
The weight of an object on the Moon becomes one-sixth of its weight on the Earth. What causes this change? Does the mass of the object also become one-sixth of its mass on the Earth?

Ans :

The weight of an object is the gravitational force with which a planet or moon pulls it. The change in weight is caused by the difference in the gravitational force of the Moon compared to the Earth. The Moon has a much weaker gravitational pull.

No, the mass of the object does not become one-sixth of its mass on Earth. Mass is the amount of matter in an object, and its value remains the same everywhere, regardless of location.

10. Three objects 1, 2, and 3 of the same size and shape but made of different materials are placed in the water. They dip to different depths as shown in Figure 5.17. If the weights of the three objects 1, 2, and 3 are W_1, W_2, and W_3, respectively, then



(i) $W_1 = W_2 = W_3$
(ii) $W_1 > W_2 > W_3$
(iii) $W_2 > W_3 > W_1$
(iv) $W_3 > W_1 > W_2$

Ans :

(iii) $W_2 > W_3 > W_1$

Since all three objects are floating, the upward buoyant force on each object is equal to its weight. The buoyant force is equal to the weight of the water displaced by the submerged part of the object. Object 2 is submerged the most, meaning it displaces the most water and thus experiences the largest buoyant force. Therefore, its weight (W_2) is the greatest. Object 1 is submerged the least, displaces the least water, and so its weight (W_1) is the smallest. Object 3 is submerged to a level between 1 and 2, so its weight (W_3) is between W_1 and W_2.

MULTIPLE CHOICE QUESTION

11. In scientific terms, what is the general name for a push or a pull applied on an object?
(A) Force (B) Interaction
(C) Motion (D) Pressure

Ans :

(A) Force
A force is defined as a push or a pull that one object exerts on another. This interaction can cause a change in the object's state of motion, shape, or direction. It is the fundamental concept for describing interactions between objects.

12. For a force to come into play, what is the minimum requirement?
(A) At least one object must be in motion.
(B) At least two objects must interact with each other.
(C) At least one object must be at rest.
(D) The objects must be of the same size.

Ans :

(B) At least two objects must interact with each other.
A force arises from the interaction between two or more objects. An object cannot exert a force on itself. For any push or pull to occur, there must be an interaction, whether through contact or at a distance, between at least two separate objects.

13. When a fielder in a cricket match catches a fast-moving ball, what is the primary effect of the force applied by the fielder's hands?
(A) To change the shape of the ball.
(B) To increase the speed of the ball.
(C) To stop the moving ball.
(D) To change the mass of the ball.

Ans :

(C) To stop the moving ball.
The force applied by the fielder's hands acts against the motion of the cricket ball. This force causes the ball to decelerate rapidly and come to a stop, demonstrating that a force can stop a moving object or change its speed.

14. What is the SI unit of force?
(A) Kilogram (kg)
(B) Pascal (Pa)
(C) Meter per second (m/s)
(D) Newton (N)

Ans :

(D) Newton (N)
The standard international (SI) unit for measuring force is the newton, which is represented by the symbol 'N'. This unit is used universally in science and engineering to quantify the magnitude of pushes and pulls.

15. Which of the following is an example of a contact force?
(A) Frictional force
(B) Magnetic force
(C) Gravitational force
(D) Electrostatic force

Ans :

(A) Frictional force
Contact forces are those that act only when there is physical contact between objects. Frictional force arises from the direct contact between two surfaces that are sliding or trying to slide past each other, making it a classic example of a contact force.

16. The force that results from the action of muscles in our body is known as what?
(A) Gravitational force
(B) Muscular force
(C) Frictional force
(D) Electrostatic force

Ans :

(B) Muscular force
Muscular force is a type of contact force generated by the contraction and elongation of muscles. It is responsible for nearly all physical activities performed by humans and animals, such as walking, lifting, pushing, and jumping.

17. A ball rolling on a flat ground eventually stops on its own. What force is responsible for bringing the ball to rest?
(A) Muscular force
(B) Magnetic force
(C) Force of friction
(D) Electrostatic force

Ans :

(C) Force of friction
The force of friction acts between the surface of the rolling ball and the ground. This force always opposes the motion of the object, causing the ball to gradually slow down and eventually come to a complete stop.

Click Here to Buy book on Amazon

18. In which direction does the force of friction always act?
(A) In the same direction as the motion.
(B) In a direction perpendicular to the motion.
(C) In a downward direction towards the Earth.
(D) In the direction opposite to the motion.

Ans :

(D) In the direction opposite to the motion.
Friction is a resistive force that opposes the relative motion or tendency of motion between surfaces in contact. Therefore, it always acts in a direction that is directly opposite to the direction in which the object is moving or trying to move.

19. Which of the following is NOT an effect of applying a force on an object?
(A) It can change the object's mass.
(B) It can change the object's speed.
(C) It can change the object's shape.
(D) It can make the object move from rest.

Ans :

(A) It can change the object's mass.
Applying a force can change an object's state of motion (speed and direction) or its shape. However, force does not change the mass of an object, which is the amount of matter it contains.

20. A magnet attracting an iron pin from a distance is an example of which type of force?
(A) Contact force
(B) Non-contact force
(C) Frictional force
(D) Muscular force

Ans :

(B) Non-contact force
A non-contact force is a force that acts on an object without coming physically in contact with it. Magnetic force can act over a distance, allowing a magnet to pull an iron pin towards it without touching it.

21. What happens when two like poles of magnets (e.g., North-North) are brought close to each other?
(A) They attract each other.
(B) They have no effect on each other.
(C) They repel each other.
(D) They become demagnetized.

Ans :

(C) They repel each other.
A fundamental property of magnets is that like poles repel each other, while unlike poles (North-South) attract. When two North poles or two South poles are brought near each other, they will exert a repulsive force, pushing each other apart.

22. After rubbing a plastic scale with a piece of polythene, the scale can attract small pieces of paper. This is due to which force?
(A) The fundamental force of gravity acting on the paper.
(B) The magnetic force from the plastic scale's material.
(C) The muscular force applied by the student's hand.
(D) The electrostatic force from the electrically charged scale.

Ans :

(D) The electrostatic force from the electrically charged scale.
Rubbing the plastic scale causes it to acquire an electrical charge (static electricity). This charged object can then exert an electrostatic force on uncharged objects like small pieces of paper, attracting them without any physical contact.

23. What is the nature of the charges acquired by two balloons that are both rubbed with the same piece of woollen cloth?
(A) They acquire similar charges.
(B) They acquire opposite charges.
(C) Only one balloon gets charged.
(D) Neither balloon gets charged.

Ans :

(A) They acquire similar charges.
When two identical objects, like balloons, are charged in the same way (by rubbing with the same material), they acquire the same type of electrical charge. Since like charges repel, the two similarly charged balloons will push each other away.

NODIA

24. What is the force with which the Earth attracts all objects towards itself called?
(A) Electrostatic force
(B) Gravitational force
(C) Frictional force
(D) Magnetic force

Ans :

(B) Gravitational force
Gravitational force is the universal force of attraction between all objects with mass. The specific force exerted by the Earth on objects near

its surface is commonly referred to as gravity, which pulls everything towards the planet's center.

25. How does gravitational force differ from magnetic or electrostatic forces?
(A) Gravitational force can only repel objects.
(B) Gravitational force is a contact force.
(C) Gravitational force is always attractive.
(D) Gravitational force only acts on magnets.

Ans :

(C) Gravitational force is always attractive.
While magnetic and electrostatic forces can be either attractive (unlike poles/charges) or repulsive (like poles/charges), gravitational force is solely an attractive force. It always pulls objects with mass towards each other and never pushes them apart.

26. The force with which the Earth pulls an object towards itself is also known as the object's _____.
(A) Mass
(B) Density
(C) Volume
(D) Weight

Ans :

(D) Weight
An object's weight is specifically defined as the measure of the gravitational force exerted on it by a large body, such as the Earth. Since weight is a force, its SI unit is the newton (N).

27. What is the SI unit of weight?
(A) Newton (N)
(B) Kilogram (kg)
(C) Gram (g)
(D) Meter (m)

Ans :

(A) Newton (N)
Since weight is a measure of the force of gravity on an object, it is measured in the same SI unit as force. Therefore, the SI unit of weight is the newton, symbolized by 'N'.

28. A spring balance is a device used to measure an object's _____.
(A) Mass
(B) Weight
(C) Volume
(D) Density

Ans :

(B) Weight
A spring balance works by measuring the extension of a spring caused by an object hanging from it. This extension is directly proportional to the force of gravity acting on the object, which is its weight. The scale is calibrated to read this force.

29. What is the key difference between an object's mass and its weight?
(A) Mass is a type of force, while weight is the amount of matter.
(B) Mass is measured in Newtons, while weight is measured in kilograms.
(C) Mass is constant, while weight can change with gravitational force.
(D) Both an object's mass and its weight are constant everywhere.

Ans :

(C) Mass is constant, while weight can change with gravitational force.
Mass is the amount of matter in an object and remains the same regardless of location. Weight is the gravitational pull on that mass and varies with the strength of the gravitational field. For example, an object's weight on the Moon is less than on Earth, but its mass is identical.

30. The image of two ring magnets floating one above the other on a wooden stick demonstrates which principle?

Force between two ring magnets

(A) Unlike poles of magnets attract each other.
(B) Magnets can only attract iron.
(C) Gravitational force is stronger than magnetic force.
(D) Like poles of magnets repel each other.

Ans :

(D) Like poles of magnets repel each other.
For the top magnet to float, it must be pushed upward by the bottom magnet. This repulsive force occurs when the like poles (e.g., North facing

NODIA

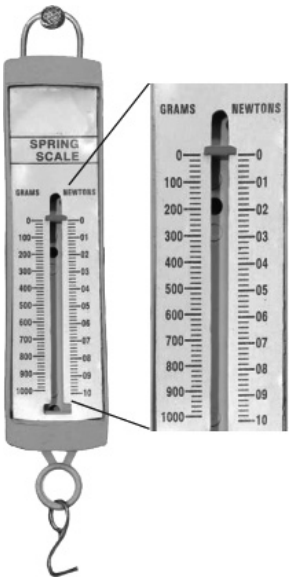
North) of the two magnets are facing each other, creating a magnetic cushion that counteracts gravity.

31. Muscular force and frictional force are examples of _____ forces, while gravitational force and magnetic force are examples of _____ forces.
(A) Contact, non-contact
(B) Non-contact, contact
(C) Attractive, repulsive
(D) Balanced, unbalanced

Ans :

(A) Contact, non-contact
Muscular and frictional forces require direct physical touching to act, so they are classified as contact forces. Gravitational and magnetic forces can act over a distance without any physical touching, classifying them as non-contact forces.

32. In the spring balance shown in figure, the difference between major marks '01 N' and '02 N' is 1 N, and there are 5 divisions between them. What is the value of one small division?



A spring balance and close-up of its scale

(A) 1.0 N
(B) 0.5 N
(C) 0.2 N
(D) 5.0 N

Ans :

(C) 0.2 N
The least count of a measuring instrument is the smallest value it can measure. To find it, divide the value between two major marks by the number of divisions. Here, it is 1 N divided by 5 divisions, which equals 0.2 N per division.

33. If you hang different objects from the same spring, and the spring stretches by different amounts, what can you conclude?
(A) The objects have the same mass but different weights.
(B) The objects have different masses and different weights.
(C) The spring is faulty.
(D) All objects have the same weight.

Ans :

(B) The objects have different masses and different weights.
The stretch of the spring is proportional to the weight of the object. Different amounts of stretch indicate that the Earth is pulling on the objects with different forces, meaning their weights are different. This also implies their masses are different.

34. The upward force applied by a liquid on an object placed in it is known as _____.
(A) Gravitational force
(B) Weight
(C) Friction
(D) Upthrust or buoyant force

Ans :

(D) Upthrust or buoyant force
When an object is immersed in a liquid, the liquid exerts an upward pressure on the object's surfaces. This net upward force is called upthrust or buoyant force, and it acts in the opposite direction to the force of gravity.

35. An object sinks in a liquid when which condition is met?
(A) The gravitational force is greater than the upward buoyant force.
(B) The buoyant force is significantly greater than the gravitational force.
(C) The buoyant force and the gravitational force are exactly equal.
(D) The object has no gravitational force acting upon it in the liquid.

Ans :

(A) The gravitational force is greater than the upward buoyant force.
An object placed in a liquid experiences two main vertical forces : the downward pull of gravity (its weight) and the upward push of the buoyant force.

Downloaded from www.pdf.tube

If the downward gravitational force is stronger than the upward buoyant force, the object will sink.

36. Sonali and Ragini are cycling downhill. They notice their bicycles move at great speed even without pedalling. What non-contact force is pulling them downhill?
(A) Frictional force
(B) Gravitational force
(C) Muscular force
(D) Magnetic force

Ans :

(B) Gravitational force
On a slope, the force of gravity pulls the cyclists and their bicycles downwards along the hill. This gravitational pull is what causes them to accelerate and gain speed, even without the application of muscular force from pedalling.

37. A force applied to an object can do all of the following EXCEPT:
(A) Change its direction of motion.
(B) Change its speed.
(C) Change its weight.
(D) Change its shape.

Ans :

(C) Change its weight.
Applying a force can alter an object's motion (speed and direction) or deform it (change its shape). However, an external push or pull does not change the object's weight, which is the specific gravitational force acting upon its mass.

38. According to Archimedes' Principle, the upward buoyant force on an immersed object is equal to what?
(A) The total weight of the object itself when measured in air.
(B) The total volume of the liquid in the container.
(C) The density of the material from which the object is made.
(D) The weight of the liquid displaced by the submerged object.

Ans :

(D) The weight of the liquid displaced by the submerged object.
Archimedes' Principle states that an object fully or partially submerged in a fluid experiences an upward buoyant force. The magnitude of this force is precisely equal to the weight of the fluid that the object displaces.

39. It is easier to slip on a wet floor than a dry floor. This is because the water between the shoe and the floor _____.
(A) Reduces the force of friction
(B) Increases the force of friction
(C) Increases the gravitational pull
(D) Creates a magnetic field

Ans :

(A) Reduces the force of friction
Friction between two surfaces is what provides grip. A layer of water on the floor acts as a lubricant, separating the irregularities of the shoe and the floor. This significantly reduces the force of friction, making it much easier to slip.

Download INDIA's Best Study app NODIA

40. Which of the following forces is the "odd one out"?
(A) Magnetic Force
(B) Muscular Force
(C) Electrostatic Force
(D) Gravitational Force

Ans :

(B) Muscular Force
Magnetic, electrostatic, and gravitational forces are all non-contact forces, meaning they can act at a distance. Muscular force is a contact force, as it requires direct physical contact between muscles and the object being acted upon.

NODIA

41. If an object is at rest on a table, does it mean that no forces are acting on it?
(A) Yes, if an object is at rest, there are absolutely no forces.
(B) Yes, forces can only act on objects that are currently moving.
(C) No, it means the forces acting on it are balancing each other.
(D) No, only the muscular force from a person is acting on it.

Ans :

(C) No, it means the forces acting on it are balancing each other.
An object at rest is in a state of equilibrium. This does not mean an absence of forces. It means that all the forces acting on it, such as the downward force of gravity and the upward support force from the table, are equal in magnitude and opposite in direction, resulting in a net force of zero.

42. In figure , a person is pushing a box (a), pulling it with a rope (b), and lifting it (c). What do all three actions have in common?

Moving a box in different ways (a) Pushing ; (b) Pulling ; (c) Lifting (pulling up), and carrying

(A) They all involve a pull.
(B) They all decrease the box's weight.
(C) They all involve non-contact forces.
(D) They all involve applying a force (a push or a pull).

Ans :

(D) They all involve applying a force (a push or a pull).
The figure illustrates different ways to move a box. Pushing, pulling, and lifting are all different forms of applying a force. In each case, an interaction occurs between a person and the box, resulting in a push or pull that can cause motion.

43. An object is thrown vertically upwards. Its speed decreases as it goes up, it stops momentarily, and then it falls back down. This entire vertical motion occurs under the influence of which force?
(A) Gravitational force
(B) Frictional force
(C) Electrostatic force
(D) Air resistance only

Ans :

(A) Gravitational force
Throughout its entire journey, both upwards and downwards, the object is constantly acted upon by the Earth's gravitational force, which pulls it downwards. This force is what slows the object down on its way up and accelerates it on its way down.

44. While both can be either attractive or repulsive, electrostatic force acts between _____, whereas magnetic force acts between _____.
(A) Magnets; charged bodies
(B) Charged bodies; magnets
(C) Planets; surfaces
(D) Muscles; ropes

Ans :

(B) Charged bodies; magnets
Electrostatic force is the force that exists between electrically charged particles or objects. Magnetic force is the force that arises between magnets or between a magnet and a magnetic material like iron. Both are distinct non-contact forces.

45. What are forces that act only when there is physical contact between the objects called?
(A) Balanced forces
(B) Non-contact forces
(C) Contact forces
(D) Gravitational forces

Ans :

(C) Contact forces
Contact forces are defined by the requirement of direct physical interaction. For these forces to be exerted, the objects must touch each other, either directly or through an intermediary like a rope or stick.

Download INDIA's Best Study app NODIA

46. On a rough surface, the force of friction is _____, causing a moving bicycle to stop _____ than on a smoother road.
(A) Smaller, later
(B) Greater, later
(C) Smaller, sooner
(D) Greater, sooner

Ans :

(D) Greater, sooner
Friction is greater on rough surfaces because their irregularities interlock more strongly. This larger opposing force causes a moving object, like a bicycle, to decelerate more quickly and come to a stop in a shorter distance or time.

47. Like charges _____ each other, and unlike charges _____ each other.
(A) Repel, attract
(B) Attract, repel
(C) Attract, attract
(D) Repel, repel

Ans :

(A) Repel, attract
This is a fundamental rule of electrostatics. Two objects with the same type of charge (both positive or both negative) will exert a repulsive force on each other. Two objects with opposite charges (one positive, one negative) will exert an attractive force.

Click Here to Buy book on Amazon

48. Humans have long used animals like oxen and horses to assist with tasks like ploughing fields and pulling carts. This is an application of the animal's _____.

(A) Gravitational force

(B) Muscular force

(C) Magnetic force

(D) Electrostatic force

Ans :

(B) Muscular force

Animals perform these tasks by using the force generated by their muscles. This muscular force is a contact force that they apply to the plough or cart, allowing them to pull heavy loads and assist with human labor.

49. An object will float in a liquid if the upward buoyant force is _____ the downward gravitational force.

(A) Greater than

(B) Less than

(C) Equal to

(D) Unrelated to

Ans :

(C) Equal to

For an object to float in a state of equilibrium within a liquid, the forces acting on it must be balanced. This occurs when the upward push of the buoyant force from the liquid is exactly equal in magnitude to the downward pull of gravity (the object's weight).

50. A student hangs a pencil box from a spring balance, and the reading is 2 N. Then, a heavier tiffin box is hung, and the reading is 5 N. What does this demonstrate?

(A) The spring balance is broken.

(B) Gravity only acts on the tiffin box.

(C) The pencil box has more mass.

(D) Different objects have different weights.

Ans :

(D) Different objects have different weights.

The spring balance measures weight (the force of gravity). The different readings indicate that the Earth is pulling on the two objects with different amounts of force. Therefore, the pencil box and the tiffin box have different weights.

Download INDIA's Best Study app NODIA

51. Which of the following statements about forces is incorrect?

(A) A force can only change an object's speed, not its direction.

(B) A force is a simple push or a pull on an object.

(C) Two objects must interact for a force to come into play.

(D) The standard international (SI) unit of force is the newton (N).

Ans :

(A) A force can only change an object's speed, not its direction.

A force can change an object's state of motion, which includes both its speed and its direction. For example, hitting a moving ball with a bat can change both how fast it's going and the direction it's traveling in.

NODIA

52. A fruit falling from a tree is a direct result of which force?

(A) Frictional force

(B) Gravitational force

(C) Muscular force

(D) Electrostatic force

Ans :

(B) Gravitational force

The Earth exerts a gravitational force on all objects, including the fruit on a tree. This constant downward pull is what causes the fruit to detach from the branch and accelerate towards the ground once its stem can no longer support it.

53. Why are the bottoms of ships and high-speed trains designed with specific, streamlined shapes?

(A) To significantly increase their total weight and stability.

(B) To increase the overall effect of the gravitational force.

(C) To reduce the force of friction from the water or air.

(D) To make them look more aesthetically pleasing and attractive.

Ans :

(C) To reduce the force of friction from the water or air.

Fluids like water and air exert a frictional force (drag) on objects moving through them. A streamlined shape is designed to allow the fluid to flow smoothly around the object, minimizing this resistance and allowing the ship or train to move more efficiently.

54. When an object is said to be "charged," it means it has acquired _____.
(A) More mass
(B) A magnetic field
(C) A higher temperature
(D) Ctatic electrical charges

Ans :

(D) Static electrical charges
A charged object is one that has a net positive or negative electrical charge, typically acquired by rubbing it with another material. These static charges do not move by themselves but can exert an electrostatic force on other objects.

55. If a student wants to increase the frictional force between a moving box and a surface, they should _____.
(A) Switch to a rougher surface
(B) Make the surface smoother
(C) Apply oil to the surface
(D) Lift the box slightly

Ans :

(A) Switch to a rougher surface
The force of friction is highly dependent on the nature and irregularities of the surfaces in contact. Rougher surfaces have more pronounced irregularities that interlock, resulting in a greater frictional force compared to smoother surfaces.

56. Repulsion is to like charges as _____ is to unlike charges.
(A) Friction (B) Attraction
(C) Gravity (D) Repulsion

Ans :

(B) Attraction
This analogy is based on the fundamental laws of electrostatics. Like charges (positive-positive or negative-negative) repel each other. Conversely, unlike or opposite charges (positive-negative) attract each other.

57. An empty plastic bottle is pushed into a bucket of water and then released. What is the sequence of events?
(A) The bottle sinks to the very bottom of the bucket and stays there.
(B) The bottle stays exactly where it was released under the water.
(C) An upward push is felt, and the bottle bounces up to the surface.
(D) The water level in the bucket drops significantly as a result.

Ans :

(C) An upward push is felt, and the bottle bounces up to the surface.
When pushed into the water, the bottle displaces a volume of water, and the water exerts an upward buoyant force on it. Because the empty bottle's weight is much less than this buoyant force, a net upward force pushes it back to the surface when released.

58. The image of a farmer ploughing a field with two oxen is an example of using which type of force to assist with human tasks?

Use of muscular force of animals to assist with human tasks

(A) Electrostatic force
(B) Gravitational force
(C) Magnetic force
(D) Muscular force

Ans :

(D) Muscular force
The oxen are using the force generated by their muscles to pull the plough through the soil. This is a practical application where the muscular force of animals is harnessed to perform difficult agricultural labor.

59. On Earth, an object with a mass of 1 kg has a weight of approximately 10 N. On the Moon, its mass is 1 kg, but its weight is only 1.6 N. This difference in weight is due to the Moon having a weaker _____.
(A) The moon having a much weaker gravitational force than Earth.
(B) The moon's weaker and less influential magnetic field.
(C) The moon's very thin and almost non-existent atmosphere.
(D) The moon's strong and consistent electrostatic charge.

Ans :

Downloaded from www.pdf.tube

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

(A) The moon having a much weaker gravitational force than Earth.
Weight is a direct measure of the force of gravity. The Moon is much smaller and less massive than the Earth, so its gravitational pull is significantly weaker. This results in the object having a much lower weight on the Moon, even though its mass remains unchanged.

60. The interaction between two surfaces in contact that arises from irregularities, even on surfaces that appear smooth, is known as _____.
(A) Gravity
(B) Friction
(C) Weight
(D) Magnetism

Ans :

(B) Friction
Friction is caused by the microscopic irregularities present on all surfaces. When two surfaces are in contact, these irregularities interlock and resist any attempt to move one surface over the other, creating the force of friction.

61. A student finds that a spring balance shows a reading of 0 N when nothing is hung from it, and 10 N when a 1 kg standard mass is hung from it on Earth. What fundamental concept does this demonstrate?
(A) The direct relationship between an object's mass and magnetic force.
(B) The physical conversion of an object's mass directly into energy.
(C) The relationship between mass and its corresponding weight (gravity).
(D) The basic principle of electrostatic attraction and repulsion.

Ans :

(C) The relationship between mass and its corresponding weight (gravity).
This observation shows that an object's mass is directly related to its weight. The spring balance measures the force of gravity (weight) in newtons, which is proportional to the object's mass in kilograms.

62. Chewing food and pushing it through the alimentary canal are internal bodily functions that rely on which type of force?
(A) Gravitational force
(B) Magnetic force
(C) Frictional force
(D) Muscular force

Ans :

(D) Muscular force
Many internal processes, including digestion, are driven by muscular force. The muscles of the jaw are used for chewing, and the smooth muscles of the alimentary canal contract and relax to push food along its path.

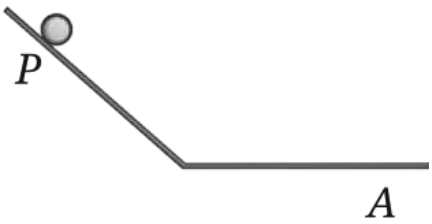
63. Which statement about non-contact forces is incorrect?
(A) Frictional force is a type of non-contact force.
(B) They can act even if the objects are not touching.
(C) Magnetic force is a type of non-contact force.
(D) Gravitational force is a type of non-contact force.

Ans :

(A) Frictional force is a type of non-contact force.
Frictional force is a contact force because it requires the surfaces of two objects to be in direct physical contact to exist. Magnetic, gravitational, and electrostatic forces are all non-contact forces as they can act over a distance.

NODIA

64. To make a ball released from point P stop before point A on the horizontal surface in figure, one could _____.



(A) Make the horizontal surface smoother
(B) Make the horizontal surface rougher
(C) Increase the mass of the ball
(D) Release the ball from a higher point on the incline

Ans :

(B) Make the horizontal surface rougher
The ball stops at point A due to the force of friction on the horizontal surface. To make it stop sooner (before A), the frictional force needs to be increased. Making the surface rougher will increase friction, causing the ball to slow down more quickly.

65. When a charged balloon is brought near another similarly charged balloon, they move away from each other. This happens because _____.

(A) Unlike charges repel each other
(B) Gravity pushes them apart
(C) Like charges repel each other
(D) The air between them gets heated

Ans :

(C) Like charges repel each other
Both balloons, having been charged in the same way, possess similar electrical charges (e.g., both negative). The fundamental principle of electrostatics states that like charges exert a repulsive force on one another, causing the balloons to push each other away.

66. Weight is the _____ force with which an object is pulled, whereas _____ is the amount of matter in it.
(A) Magnetic, density
(B) Frictional, volume
(C) Muscular, shape
(D) Gravitational, mass

Ans :

(D) Gravitational, mass
This question directly contrasts the definitions of weight and mass. Weight is specifically the gravitational force acting on an object, while mass is the intrinsic measure of the amount of matter the object contains.

67. Identify the odd one out based on the type of force.
(A) A fruit falling from a tree.
(B) A child lifting a school bag.
(C) A cricket ball stopping on its own.
(D) A farmer's ox pulling a plough.

Ans :

(A) A fruit falling from a tree.
The actions of lifting a bag, a ball stopping due to friction, and an ox pulling a plough all involve contact forces (muscular and frictional). A fruit falling from a tree is caused by the non-contact force of gravity.

68. If the weight of a liquid displaced by a floating ship is equal to the ship's own weight, what principle does this illustrate?
(A) The law of universal gravitation.
(B) Archimedes' Principle.
(C) The principle of electrostatic attraction.
(D) The laws of motion.

Ans :

(B) Archimedes' Principle.
Archimedes' Principle directly relates to buoyancy. It states that an object will float if the weight of the fluid it displaces is equal to its own weight. This balance between the upward buoyant force and the downward weight allows the object to float.

69. Why does an astronaut have a different weight on the Moon compared to Earth, even though their body is unchanged?
(A) The astronaut's total mass changes when they are on the Moon.
(B) There is significantly more friction on the surface of the Moon.
(C) The Moon's gravitational pull is different from the Earth's.
(D) The Moon has a much stronger and more powerful magnetic field.

Ans :

(C) The Moon's gravitational pull is different from the Earth's.
Weight is the product of mass and the strength of gravity. The astronaut's mass (the amount of matter in their body) remains constant. However, the Moon's gravitational pull is much weaker than Earth's, so the force of gravity on the astronaut, their weight, is significantly less.

70. Which of the forces listed below can be either attractive or repulsive?
(A) Frictional force
(B) Gravitational force
(C) Buoyant force
(D) Electrostatic force

Ans :

(D) Electrostatic force
Electrostatic force can be attractive (between opposite charges) or repulsive (between like charges). In contrast, gravitational force is always attractive, and frictional and buoyant forces are always opposing forces.

71. Two balloons are rubbed with a woollen cloth and brought near each other. They move apart. Why does this happen?
(A) They acquire similar electric charges and therefore repel each other.
(B) The balloons become much heavier and fall away from each other.
(C) The air between them becomes a vacuum, pulling them apart.
(D) They acquire opposite electric charges and therefore repel each other.

Click Here to Buy book on Amazon

Ans :

(A) They acquire similar electric charges and therefore repel each other.
Rubbing both balloons with the same cloth gives them the same type of static electric charge. Since like charges exert a repulsive force, the two balloons will push each other away when brought close together.

72. Which statement about weight is incorrect?
(A) It is the force with which the Earth pulls an object.
(B) It remains the same everywhere in the universe.
(C) Its SI unit is the newton (N).
(D) It is measured using a spring balance.

Ans :

(B) It remains the same everywhere in the universe.
Weight is dependent on the local gravitational force. Since the strength of gravity varies from one celestial body to another (e.g., Earth vs. Moon), the weight of an object will change depending on its location. Mass is the quantity that remains constant.

73. How is muscular force different from magnetic force?
(A) Muscular force is a push, while magnetic force is always a pull.
(B) Muscular force is always stronger than any magnetic force.
(C) Muscular force is a contact force; magnetic is non-contact.
(D) Muscular force acts between magnets; magnetic acts between muscles.

Ans :

(C) Muscular force is a contact force; magnetic is non-contact.
The fundamental difference lies in their mode of application. Muscular force requires direct physical contact to be exerted. Magnetic force can act over a distance without any physical contact between the interacting objects.

74. An object placed in a liquid feels lighter than it does in the air. This apparent loss of weight is due to the _____.
(A) Decrease in the object's mass
(B) Liquid's temperature
(C) Electrostatic force from the liquid
(D) Upward buoyant force exerted by the liquid

Ans :

(D) Upward buoyant force exerted by the liquid
When an object is immersed in a liquid, the liquid exerts an upward buoyant force (upthrust) on it. This upward force counteracts a portion of the downward force of gravity, making the object feel lighter.

75. A force comes into play only when two objects _____. This results in a _____ or a _____.
(A) Interact, push, pull
(B) Are identical, push, motion
(C) Move, shape, size
(D) Are charged, newton, kilogram

Ans :

(A) Interact, push, pull
The text establishes a clear logical sequence. The prerequisite for a force is an interaction between at least two objects. The manifestation of this force is either a push or a pull applied by one object on the other.

76. The force that arises due to irregularities in two surfaces that are in contact is called _____.
(A) Gravity (B) Friction
(C) Magnetism (D) Upthrust

Ans :

(B) Friction
Friction is a contact force that originates from the microscopic roughness and irregularities present on all surfaces. When these surfaces try to slide past each other, the irregularities interlock, creating a force that opposes the motion.

77. In the image showing a charged plastic scale attracting paper pieces, what type of force is demonstrated?

Charged plastic scale attracting small paper pieces

(A) Contact muscular force
(B) Non-contact gravitational force
(C) Non-contact electrostatic force
(D) Contact frictional force

Downloaded from www.pdf.tube

109. What is electrostatic force?

Ans :

Electrostatic force is the force exerted by a charged body on another charged or uncharged body, which acts without direct contact between the bodies.

110. How does a charged object interact with an uncharged object?

Ans :

A charged object, which has acquired static charges, attracts or exerts a force on uncharged objects made of certain materials, like small paper pieces.

111. Define gravitational force, also known as gravity.

Ans :

Gravitational force, or gravity, is the non-contact force with which the Earth attracts or pulls all objects towards itself, and it is always attractive.

112. What is the weight of an object?

Ans :

The weight of an object is defined as the force with which the Earth pulls that specific object towards itself due to gravity.

113. What is the SI unit of weight?

Ans :

Since weight is a force, its SI unit is the same as the unit of force, which is the newton, represented by the symbol N.

114. What device is used to measure the weight of an object?

Ans :

A spring balance is a simple device that is used to measure the weight of an object by observing the amount a spring stretches.

115. Define buoyant force or upthrust.

Ans :

Buoyant force, or upthrust, is the upward force that is applied by a liquid on an object that is fully or partially immersed in it.

116. List two effects a force can have on an object.

Ans :

A force can make a stationary object move from rest or it can change the speed of an object that is already in motion.

117. How do animals like bullocks use muscular force for human tasks?

Ans :

Animals like bullocks and horses have been used by humans to apply their muscular force for tasks such as ploughing fields or pulling carts.

118. What causes friction between two surfaces?

Ans :

Friction arises due to the minute irregularities present in the two surfaces that are in contact, which lock into each other and oppose motion.

119. Name the two kinds of static electrical charges.

Ans :

The two kinds of static electrical charges, which are generated when certain materials are rubbed together, are known as 'positive' and 'negative' charges.

120. What is Archimedes' Principle?

Ans :

Archimedes' Principle states that when an object is immersed in a liquid, it experiences an upward buoyant force equal to the weight of the liquid it displaces.

NODIA

121. Why does a rolling ball on the ground eventually stop?

Ans :

A rolling ball stops due to the force of friction acting between the surface of the ball and the ground, which opposes its motion.

122. Explain why a force is considered an interaction between objects.

Ans :

A force is an interaction because it only comes into play when at least two objects interact, like a hand pushing a box.

123. Why is it easier to slip on a wet floor?

Ans :

Water on a floor reduces the irregularities between the surfaces of our feet and the floor, decreasing the force of friction that prevents slipping.

3	Applying brakes on a bicycle	C	Makes a stationary object move.
4	Hitting a moving ball with a bat	D	Changes the shape of an object.

Options

(a) 1-C, 2-D, 3-A, 4-B

(b) 1-A, 2-C, 3-B, 4-D

(c) 1-D, 2-A, 3-C, 4-B

(d) 1-B, 2-C, 3-D, 4-A

Ans :

(a) 1-C, 2-D, 3-A, 4-B

Kicking a football makes it move from rest. Pressing a balloon changes its shape. Applying brakes changes the speed (slows it down). Hitting a ball with a bat changes its direction.

Download INDIA's Best Study app NODIA

83. Match the scientific term with its correct definition.

	Column A		**Column B**
1	Weight	A	The amount of matter in an object, which is constant everywhere.
2	Friction	B	The force that opposes motion and is greater on rough surfaces.
3	Buoyant Force	C	The measure of the gravitational pull on an object, measured in newtons.
4	Mass	D	The upward push exerted by a liquid on an immersed object.

Options

(a) 1-D, 2-A, 3-B, 4-C

(b) 1-C, 2-B, 3-D, 4-A

(c) 1-B, 2-C, 3-A, 4-D

(d) 1-A, 2-D, 3-C, 4-B

Ans :

(b) 1-C, 2-B, 3-D, 4-A

Weight is the gravitational force on an object. Friction opposes motion between surfaces. Buoyant force is the upward push from a fluid. Mass is the amount of matter in an object.

84. Match the type of force with its specific characteristic.

	Column A		**Column B**
1	Contact Force	A	An attractive or repulsive force that exists between charged objects.
2	Magnetic Force	B	An always-attractive force that exists between the Earth and any object.
3	Gravitational Force	C	A force, such as friction or muscular force, that acts only when two objects are physically touching.
4	Electrostatic Force	D	An attractive or repulsive force that acts between two magnets.

Options

(a) 1-C, 2-D, 3-B, 4-A

(b) 1-D, 2-A, 3-C, 4-B

(c) 1-B, 2-C, 3-A, 4-D

(d) 1-A, 2-B, 3-D, 4-C

Ans :

(a) 1-C, 2-D, 3-B, 4-A

A contact force requires physical touching. Magnetic force acts between magnets. Gravitational force is the Earth's pull. Electrostatic force acts between charges.

85. Match the term or instrument with its scientific role or definition.

	Column A		**Column B**
1	Force	A	A simple push or pull resulting from the interaction between two objects.
2	Spring Balance	B	A type of force, like friction, that requires physical touching between objects.
3	Contact Force	C	A principle explaining that upthrust is equal to the weight of the displaced fluid.
4	Archimedes' Principle	D	An instrument used to measure the weight of an object.

Click Here to Buy book on Amazon

Options
(a) 1-D, 2-B, 3-C, 4-A
(b) 1-C, 2-A, 3-D, 4-B
(c) 1-A, 2-D, 3-B, 4-C
(d) 1-B, 2-C, 3-A, 4-D

Ans :

(c) 1-A, 2-D, 3-B, 4-C
A force is a push or pull. A spring balance measures weight. A contact force requires objects to touch. Archimedes' principle relates to buoyancy.

TRUE AND FALSE

86. A force is scientifically defined as a push or a pull on an object that results from its interaction with another object.

Ans :

True
In science, a force is generally described as the push or pull applied to an object. This force comes into play when at least two objects interact.

87. Applying a force to an object can only change its speed, but not its direction of motion or its shape.

Ans :

False
A force can change an object's speed , its direction of motion , and its shape. It may cause one or all of these effects at the same time.

88. Muscular force and the force of friction are examples of non-contact forces.

Ans :

False
Muscular force and frictional force are examples of contact forces because they require physical contact between objects to have an effect.

89. The force of friction always acts in the same direction that an object is moving.

Ans :

False
The force of friction always acts in a direction that is opposite to the direction in which the object is moving or trying to move.

Download INDIA's Best Study app NODIA

90. Electrostatic force is a type of non-contact force that is exerted by a charged body.

Ans :

True
The force from a charged object that acts on another charged or uncharged object is called electrostatic force which is a non-contact force.

91. The weight of an object refers to the amount of matter it contains, and this value is constant everywhere.

Ans :

False
Mass is the amount of matter in an object and remains the same everywhere. Weight is the gravitational force pulling on an object and can change depending on location.

92. The SI unit for both force and weight is the newton (N).

Ans :

True
The SI unit of force is the newton (N). Because weight is a measure of gravitational force, its SI unit is also the newton.

NODIA

93. A force can be exerted by a single object without any interaction with another object.

Ans :

False
For a force to come into play, at least two objects must interact with each other in some way.

94. Unlike magnetic or electrostatic forces, the force of gravity is always attractive.

Ans :

True
Gravitational force is always an attractive force, whereas magnetic and electrostatic forces can be either attractive or repulsive.

95. A spring balance is a device designed to directly measure the mass of an object in kilograms.

Ans :

False
A spring balance is a device used to measure weight, which is a force. While it may have a scale for mass, it fundamentally measures the pull of gravity.

96. When an object is placed in a liquid, it experiences an upward force known as upthrust or buoyant force.

Ans :

True
The force that a liquid applies to an object in an upward direction is known as upthrust or buoyant force.

97. An object will sink in a liquid only if the upward buoyant force on it is greater than the downward gravitational force.

Ans :

False
An object sinks if the downward gravitational force is more than the upward buoyant force. It floats if the forces are equal.

98. Similar electrical charges, such as two positive charges, will attract each other.

Ans :

False
Similar (like) electrical charges repel each other, while opposite (unlike) charges attract each other.

99. The force of friction is generally greater on rough surfaces than on smooth ones.

Ans :

True
Friction is caused by irregularities in surfaces that are in contact. Therefore, the force of friction is greater on rough surfaces.

100. An object's mass remains the same on different planets, but its weight can change.

Ans :

True
The mass of an object is constant, but its weight depends on the gravitational force of the planet it is on, so its weight will be different on different planets.

VERY SHORT QUESTIONS

101. What is the scientific definition of a force?

Ans :

In science, a force is generally defined as a push or a pull that is applied to an object, resulting from its interaction with another object.

102. What is the SI unit of force and what is its symbol?

Ans :

The SI unit of force is the newton, which is written with a small 'n'. The symbol used to represent the newton is N.

103. List two examples of contact forces discussed in the chapter.

Ans :

The two examples of contact forces discussed in the chapter are muscular force, which is caused by the action of muscles, and frictional force.

104. What is muscular force?

Ans :

Muscular force is a type of contact force that results from the action of muscles in our body, such as during walking, lifting, or pushing.

105. In which direction does the force of friction always act?

Ans :

The force of friction always acts in a direction that is opposite to the direction in which an object is moving or attempting to move.

106. What are non-contact forces?

Ans :

Non-contact forces are forces that can exert their effect on objects even when the objects are not in direct physical contact with each other.

107. Define magnetic force.

Ans :

Magnetic force is the force exerted by a magnet on another magnet or on a magnetic material, which can be either attractive or repulsive.

108. What happens when like poles of two magnets are brought near each other?

Ans :

When two magnets are brought close to each other, their like poles, such as North-North or South-South, will repel each other with a magnetic force.

Downloaded from www.pdf.tube

Ans :

(C) Non-contact electrostatic force
The scale, having been charged by rubbing, exerts a force on the paper pieces from a distance, without touching them. This force between a charged object and an uncharged object is known as electrostatic force, which is a non-contact force.

78. To measure the weight of a small stone accurately, which device should be used?
(A) A measuring tape
(B) A thermometer
(C) A beam balance
(D) A spring balance

Ans :

(D) A spring balance
A spring balance is specifically designed to measure force, which includes weight. It directly measures the gravitational pull on the stone. A beam balance, in contrast, compares the weights of two objects to determine mass.

79. A student observes that a heavy iron block sinks in water, but a much larger block of wood floats. This is because the relationship between the object's weight and the _____ is different for the two blocks.
(A) Magnetic force
(B) Buoyant force
(C) Frictional force
(D) Electrostatic force

Ans :

(B) Buoyant force
An object's ability to float or sink depends on the balance between its weight (downward force) and the buoyant force (upward force) from the water. For the iron block, its weight is greater than the buoyant force. For the wood block, its weight is less than or equal to the buoyant force.

80. The fact that your weight would be different on Jupiter than on Earth, while your mass would be the same, illustrates that weight is dependent on _____.
(A) The local force of gravity
(B) Temperature
(C) Atmospheric pressure
(D) Your speed

Ans :

(A) The local force of gravity
Weight is a measure of the gravitational force on an object. Different planets have different masses and sizes, resulting in different gravitational strengths. Therefore, the weight of an object is specific to its location in a gravitational field, while its mass is an intrinsic, unchanging property.

MATCHING TYPE QUESTIONS

81. Match the type of force with its correct description.

	Column A		Column B
1	Muscular Force	A	A non-contact force that pulls all objects towards the Earth.
2	Gravitational Force	B	A contact force caused by the action of muscles, used for lifting or pushing.
3	Frictional Force	C	A non-contact force between two charged objects.
4	Electrostatic Force	D	A contact force that opposes the motion between two surfaces.

Options
(a) 1-D, 2-C, 3-A, 4-B
(b) 1-C, 2-D, 3-B, 4-A
(c) 1-A, 2-B, 3-C, 4-D
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(d) 1-B, 2-A, 3-D, 4-C
Muscular force is a contact force from muscles. Gravitational force is a non-contact pull from Earth. Frictional force is a contact force that opposes motion. Electrostatic force is a non-contact force between charges.

82. Match the action with the primary effect of the force involved.

	Column A		Column B
1	Kicking a stationary football	A	Changes the speed of a moving object.
2	Pressing an inflated balloon	B	Changes the direction of a moving object.

NODIA

124. How does a spring balance measure the weight of an object?

Ans :

A spring balance measures weight by showing how much its internal spring stretches due to the gravitational pull on the object hanging from its hook.

125. If you push a wall, you apply a force. Does the wall also apply a force on you?

Ans :

Yes, when two objects interact, each experiences a force from the other. Therefore, the wall also exerts a force back on your hand.

126. Classify pushing a box and a falling apple as contact or non-contact forces.

Ans :

Pushing a box involves muscular force, a contact force. A falling apple is due to gravitational force, which is a non-contact force.

127. Why does rubbing a plastic scale with polythene make it attract paper bits?

Ans :

Rubbing the scale generates static electrical charges on its surface, creating an electrostatic force that attracts the uncharged paper bits without any direct contact.

128. Compare the mass of an object on Earth and the Moon.

Ans :

The mass of an object is the amount of matter in it, which remains the same regardless of its location, so it is identical on Earth and the Moon.

129. Compare the weight of an object on Earth and the Moon.

Ans :

An object's weight is different on the Moon than on Earth because the Moon's gravitational force is much weaker, making the object weigh less.

130. Why does an empty plastic bottle bounce up when pushed into water?

Ans :

The bottle bounces up because the water exerts an upward buoyant force on it, which is greater than the downward gravitational force on the bottle.

131. Why is it said that force can change the shape of an object?

Ans :

This is said because actions like pressing an inflated balloon or rolling a chapati demonstrate that applying a force can alter an object's original shape.

132. How can you demonstrate that like charges repel using balloons?

Ans :

By rubbing two balloons with a woolen cloth to give them similar charges, they will move away from each other, demonstrating that like charges repel.

133. If an object is at rest, does it mean no forces are acting on it?

Ans :

No, it means the forces acting on the object are balanced, canceling each other out, so there is no change in its state of motion.

134. Why is the force of gravity considered a non-contact force?

Ans :

Gravity is a non-contact force because the Earth can pull an object towards itself, like a falling apple, without being in physical contact with it.

135. Why is friction considered a contact force?

Ans :

Friction is a contact force because it only arises when two surfaces are in direct physical contact and one moves or tries to move over the other.

136. Why are high-speed trains designed with specific shapes?

Ans :

High-speed trains have specific shapes to reduce the force of friction, or drag, exerted by the air as the train moves through it at high speeds.

137. An object is said to have a mass of 1 kg. What is its approximate weight on Earth?

Ans :

Click Here to Buy book on Amazon

The weight of an object with a 1 kg mass on Earth is approximately 10 newtons (N), as this is the gravitational force it experiences.

138. When does an object sink in a liquid according to Archimedes' Principle?

Ans :

According to Archimedes' Principle, an object will sink if its weight is greater than the weight of the liquid it displaces, which is the buoyant force.

139. Give one example where a force changes the shape of an object.

Ans :

An example of force changing an object's shape is when we stretch a rubber band, causing it to elongate from its original form.

140. Explain why pumice rock, a solid, can float on water.

Ans :

Pumice rock floats because it is filled with tiny trapped air pockets, which makes its overall density less than the density of water.

SHORT ANSWER QUESTIONS

141. Describe the four main effects that a force can produce on an object.

Ans :

A force can produce several effects on an object. It can make a stationary object move, change the speed of a moving object, alter the direction of its motion, or change the object's shape. For example, kicking a football makes it move, while applying brakes on a bicycle changes its speed and hitting a ball with a bat can change its direction.

142. What is friction? List the key characteristics of this force.

Ans :

Friction is a contact force that comes into play when an object moves or tries to move over another surface. Its key characteristics are:

- It always acts in a direction opposite to the motion.
- It arises due to the interlocking of irregularities on the two surfaces.
- Its magnitude depends on the nature of the surfaces in contact.

143. The table shows that a 1 kg object has different weights on different planets. Explain why the weight changes but the mass remains constant. Based on the data, on which planet would the object feel heaviest, and on which would it feel lightest?

Planet	**Mass of the object**	**Weight of the object**
Earth	1 kg	10 N
Moon	1 kg	1.6 N
Mars	1 kg	3.8 N
Jupiter	1 kg	25.4 N

Ans :

Mass is the amount of matter in an object and is always constant. Weight is the gravitational force exerted by a planet, which varies. The object feels heaviest on Jupiter (25.4 N) and lightest on the Moon (1.6 N) due to their different gravitational pulls.

144. Explain what a non-contact force is. Name and briefly describe the three types mentioned.

Ans :

A non-contact force is a force whose effect can be experienced even if the interacting objects are not in direct physical contact. The three types are magnetic force, which is the attraction or repulsion between magnets; electrostatic force, exerted by a charged body on another; and gravitational force, the pull exerted by the Earth on all objects towards its center.

145. How are static charges generated? Describe the interaction between charges.

Ans :

Static charges are generated when two objects of certain materials are rubbed together, causing a build-up of electrical charges on their surfaces. The interactions are:

- Similar or like charges will repel each other.
- Opposite or unlike charges will attract each other.
- A charged body can also attract an uncharged body.

NODIA

146. What is the difference between mass and weight? Explain why an object's mass is constant.

Ans :

Mass is the amount of matter in an object, measured in kilograms, and it remains the same everywhere. Weight, however, is the gravitational force pulling on that object, measured in newtons, and it can change depending on the strength of gravity. An object's mass is constant because the quantity of matter it contains does not change with its location.

147. What is muscular force? Provide examples of its use by both humans and animals.

Ans :

Muscular force is a contact force caused by the action of muscles contracting and elongating during physical activity. Key examples of its use include:

- Humans use it for walking, lifting objects, and pushing things.
- Animals use it for movement, survival, and to assist with human tasks like bullocks ploughing a field or horses pulling a cart.

148. Describe the concept of gravitational force and explain its nature.

Ans :

Gravitational force, or gravity, is the attractive force with which the Earth pulls all objects towards itself. It is a non-contact force, meaning it can act over a distance without physical touch. This force is always attractive, unlike magnetic or electrostatic forces which can be repulsive. It is responsible for making objects thrown upwards eventually fall back down to the ground.

149. How does a spring balance work to measure weight?

Ans :

A spring balance measures weight by utilizing the principle that a spring stretches in proportion to the force applied to it. The key aspects are:

- It contains a spring with a hook to hang an object.
- The object's weight (gravitational force) stretches the spring.
- A calibrated scale indicates the force in newtons.

NODIA

150. This table gives three examples of forces being applied. Based on the "Effect" column, summarize the different changes that the application of a force can bring about on an object.

S.No.	Action	Push/ Pull	Effect
1.	Your friend stopping your moving bicycle	Pull	Stopping or decreasing the speed of the bicycle
2.	Hitting a moving ball with a bat	Push	Changing the direction of a moving ball
3.	Pressing an inflated balloon	Push	Change in shape of the balloon

Ans :

Based on the table, a force can change an object's state of motion by stopping it or changing its speed. It can also change the direction of a moving object or bring about a change in the object's shape, as seen with the balloon.

151. What is buoyant force? Explain how it determines if an object floats or sinks.

Ans :

Buoyant force is the upward force that a liquid exerts on any object immersed in it. When an object is in a liquid, it is subjected to both the downward gravitational force and the upward buoyant force. If the gravitational force is greater than the buoyant force, the object sinks. If the two forces are equal, the object will float.

152. Describe what is meant by a force being an interaction between objects.

Ans :

A force is considered an interaction because it only arises when at least two objects affect each other through a push or a pull. For example, for a push to occur:

- There must be an object applying the push.
- There must be another object receiving the push.
- Once this interaction ceases, the force no longer exists.

Download INDIA's Best Study app NODIA

1. A push or pull is generally called a force.
2. The student's hand and the box are the two interacting objects.
3. The force will change the speed of the moving object, causing it to slow down or stop.

186. A child rolls a ball on flat, concrete ground. It travels some distance and then gradually slows down and stops. She then rolls the same ball on a rough, grassy surface with the same initial push and finds it stops much sooner. This is due to the force of friction, a contact force that always opposes the motion between surfaces.

Questions:

1. What is the name of the force that causes a moving object to slow down and stop on its own?
2. In which direction does the force of friction act on the rolling ball?
3. Why does the ball stop sooner on the grassy surface than on the concrete ground?

Ans :

1. The force is called the force of friction, or simply friction.
2. Friction always acts in a direction opposite to the direction in which the object is moving.
3. The force of friction is greater on rough surfaces. The grassy surface is rougher than the concrete, so it exerts a larger frictional force, stopping the ball sooner.

187. A student takes two ring magnets and a wooden stick. She places one magnet on the stick. When she places the second magnet on top with its like pole facing down, it floats in the air above the first one without any physical support. This happens because the magnets are exerting a repulsive magnetic force on each other from a distance.

Questions:

1. Is the magnetic force a contact force or a non-contact force?
2. Why does the second magnet float above the first one in this setup?
3. What would happen if the student flipped the second magnet over so that its opposite pole faced the first magnet?

Ans :

1. Magnetic force is a non-contact force because it can be exerted from a distance without physical contact.
2. It floats because the like poles of the two magnets are repelling each other.
3. The two magnets would attract each other, and the second magnet would no longer float but would stick to the first one.

188. An experiment involves rubbing two inflated balloons with a woollen cloth and hanging them near each other. The students observe that the balloons move away from each other. They conclude that both balloons acquired a similar electrical charge and that like charges repel. This demonstrates the non-contact electrostatic force between the two charged objects.

Questions:

1. What is the force exerted by one charged body on another called?
2. Why do the two balloons move away from each other after being rubbed with the same cloth?
3. What would the students observe if they brought the woollen cloth close to one of the charged balloons? Explain why.

Ans :

1. This force is called the electrostatic force.
2. They move away because both balloons acquire a similar charge from the cloth, and like charges repel each other.
3. The balloon would move towards the cloth. This is because the rubbing object (cloth) and the rubbed object (balloon) acquire opposite charges, and unlike charges attract each other.

Download INDIA's Best Study app NODIA

189. A student observes an apple falling from a tree. It moves straight down towards the ground without anything visibly touching it. This is due to the Earth's gravitational force, a non-contact force that attracts all objects towards its center. This force, also called gravity, is always attractive and acts on objects even when they are not in contact with the Earth.

Questions:

1. What is the force with which the Earth attracts objects towards itself called?
2. Why is the force of gravity classified as a non-contact force?
3. Is the gravitational force attractive, repulsive, or both? How does this compare to magnetic and electrostatic forces?

Ans :

Downloaded from www.pdf.tube

- A smooth tile floor has fewer irregularities, resulting in a smaller frictional force.
- A rough carpet has more significant irregularities, which creates greater interlocking and a much larger frictional force.
- Therefore, it would be much harder to push the box on the carpet.

161. A ring magnet floats above another on a wooden stick. Explain which forces are acting on the top magnet.

Ans :

Two main forces are acting on the top floating magnet. The Earth's gravitational force is pulling it downwards. At the same time, the bottom magnet is exerting an upward magnetic force of repulsion on it because their like poles are facing each other. The top magnet floats because this upward magnetic force perfectly balances the downward gravitational force, keeping it suspended.

162. A block was pushed with the same initial force across four different surfaces, and the distance it travelled was recorded in the table below. Which surface exerts the most friction, and which exerts the least? Justify your answer.

Surface Type	Distance Travelled (cm)
Glass	85
Polished Floor	70
Cloth	25
Sand	10

Ans :

Sand exerts the most friction, and glass exerts the least. Friction is a force that opposes motion and causes moving objects to slow down and stop. The shortest distance travelled (on sand) indicates the greatest opposition, hence the highest friction.

163. A ball is thrown upwards. Identify the forces acting on it during its motion.

Ans :

The forces acting on the ball are:

- **Upward motion** : The force of gravity acts downwards, and air friction also acts downwards, both opposing the motion.
- **Downward motion** : The force of gravity acts downwards, pulling the ball, while air friction acts upwards, opposing the downward motion.
- **Topmost position** : The force of gravity acts downwards.

164. A large iron ship floats, but a small iron nail sinks. Explain this observation.

Ans :

This happens due to the relationship between the object's weight and the buoyant force, which depends on the volume of water displaced. The nail is solid and displaces very little water, so the buoyant force is less than its weight, causing it to sink. The ship, although heavy, has a hollow shape that displaces a huge volume of water, creating a buoyant force equal to its weight.

165. If you hang a 5 N object and a 10 N object from the same spring, what difference would you observe?

Ans :

The stretch of a spring is proportional to the force applied to it. The difference observed would be:

- The 5 N object will cause the spring to stretch a certain amount.
- The 10 N object, having double the weight, will cause the spring to stretch twice as much as the 5 N object.

166. Why does a mug feel lighter when it is inside a bucket of water?

Ans :

When the mug is inside the water, it experiences an upward force from the water called the buoyant force. This buoyant force acts in the opposite direction to the downward pull of gravity on the mug. This upward push partially counteracts the mug's weight, making it feel lighter to lift as long as it remains submerged in the water.

167. Explain why aeroplanes and high-speed trains are given specific streamlined shapes.

Ans :

Aeroplanes and high-speed trains are designed with streamlined shapes for a specific purpose:

- They are designed to minimize the force of friction from the fluid they move through (air).
- This frictional force, often called air resistance or drag, opposes their motion.
- A streamlined shape allows air to flow smoothly around the object, reducing drag.

NODIA

153. The diagram shows three objects of the same size floating at different depths. If their weights are W_1, W_2, and W_3 respectively, arrange their weights in increasing order and justify your answer using the concept of buoyant force.

Object	Description
1	Floating, mostly submerged
2	Floating, least submerged
3	Floating, almost fully submerged|

Ans :

The increasing order of weights is $W_1 < W_2 < W_3$. For an object to float, the upward buoyant force from the water must equal its downward weight. An object that sinks deeper must have a greater weight, as it needs to displace more water to generate a larger buoyant force.

154. Explain the cause of friction at a microscopic level.

Ans :

At a microscopic level, friction is caused by the irregularities present on the two surfaces that are in contact. Even surfaces that appear smooth have a large number of minute irregularities. When one surface tries to move over the other, these irregularities interlock with each other. This interlocking opposes the motion, creating the force we experience as friction.

155. Describe magnetic force and the interactions between magnetic poles.

Ans :

Magnetic force is a non-contact force exerted by a magnet on another magnet or a magnetic material. The interactions between magnetic poles are specific:

- Like poles, such as North-North or South-South, repel each other.
- Unlike poles, such as North-South, attract each other.
- This force can act over a distance without direct contact.

156. Explain the concept of electrostatic force by describing a simple activity.

Ans :

Electrostatic force is a non-contact force between charged objects. A simple activity to demonstrate this involves rubbing a plastic scale with a piece of polythene. This action transfers charges, making the scale a charged object. When this charged scale is brought near small, uncharged pieces of paper, it attracts them, showing that the force can act without direct physical contact.

157. What is meant by vertical motion under gravity? Describe the object's speed change.

Ans :

Vertical motion under gravity refers to the movement of an object in a straight vertical line under the influence of the Earth's gravitational force.

- When an object is thrown upwards, its speed continuously decreases until it momentarily stops.
- When it falls downwards, its speed continuously increases as it is pulled by gravity.

158. State Archimedes' Principle and explain how it relates to an object floating.

Ans :

Archimedes' Principle states that an object immersed in a liquid experiences an upward buoyant force equal to the weight of the liquid it displaces. For an object to float, the buoyant force acting on it must be equal to the object's own weight. If the weight of the displaced liquid is less than the object's weight, the object will sink.

159. Sonali and Ragini found it harder to pedal their bicycles against the wind. Identify and explain the forces involved.

Ans :

In this scenario, the cyclists had to overcome two main opposing forces. The first is the frictional force between the tires and the road. The second is the force of the wind pushing against them, which is a form of friction from the air. To move forward against the wind, they had to apply a greater muscular force on the pedals to counteract these opposing forces.

160. Imagine pushing a heavy box. Compare the frictional force on a smooth tile floor versus a rough carpet.

Ans :

The force of friction depends on the nature of the surfaces in contact. The comparison would be as follows:

Click Here to Buy book on Amazon

- **Muscular Force** : This is the force resulting from the action of muscles. For example, lifting a school bag or a bullock pulling a plough both require the application of muscular force through direct contact.
- **Frictional Force** : This force opposes motion when two surfaces are in contact. For instance, a ball rolling on the ground stops due to friction, and we can walk because of the friction between our shoes and the ground.

Non-Contact Forces :

These forces can act over a distance without any physical contact between the objects.

- **Gravitational Force** : This is the attractive force exerted by the Earth on all objects. A fruit falling from a tree is pulled downwards by gravity without anything touching it.
- **Magnetic Force** : This is the force exerted by a magnet. A magnet can attract an iron nail from a distance, demonstrating a force acting without contact.

176. Describe in detail the concept of friction. Explain its cause, direction, and how the nature of surfaces influences it.

Ans :

Friction is a contact force that opposes the motion of an object when it moves or tries to move over another surface.

The key aspects are:

- **Cause** : Friction is caused by the microscopic irregularities present on the two surfaces in contact. Even surfaces that feel smooth are rough at a microscopic level. These irregularities interlock, which resists movement between the surfaces.
- **Direction** : The force of friction always acts in a direction opposite to the object's motion or intended motion. If you push a box to the right, friction acts to the left.
- **Influence of Surfaces** : The magnitude of friction depends on the nature of the surfaces. Rougher surfaces, like sand or carpet, have more pronounced irregularities, leading to stronger interlocking and greater frictional force. Smoother surfaces, like glass or polished tile, have smaller irregularities, resulting in less friction. This is why it is easier to slide an object over a smooth surface than a rough one.

Download INDIA's Best Study app NODIA

177. Differentiate between mass and weight. Explain why weight changes on different planets but mass does not, using the SI units for each.

Ans :

Mass and weight are distinct physical quantities that are often confused in everyday language.

- **Mass** : : Mass is the amount of matter an object contains. It is an intrinsic property of the object and remains constant regardless of location. For example, an object with a mass of 1 kg on Earth will also have a mass of 1 kg on the Moon. The SI unit for mass is the kilogram (kg).
- **Weight** : Weight is the force of gravity acting on an object's mass. It is calculated as mass multiplied by the gravitational acceleration. Since the strength of gravity varies from place to place, an object's weight can change. The SI unit for weight is the newton (N).
- **Variation** : An object weighing 10 N on Earth would weigh only about 1.6 N on the Moon because the Moon's gravitational pull is much weaker. However, its mass of 1 kg remains unchanged in both locations.

178. Describe electrostatic force in detail, including how objects become charged and the rules of interaction between charges.

Ans :

Electrostatic force is a non-contact force exerted by a charged body on another charged or uncharged body.

Charging Objects :

Objects become charged when certain materials are rubbed together, causing a build-up of static electrical charges on their surfaces. For example, rubbing a balloon with a woolen cloth makes both objects charged, but with opposite kinds of charges.

Types of Charges :

There are two types of charges : positive and negative.

Rules of Interaction:

- Like charges repel : Two objects with the same type of charge (e.g., two negatively charged balloons) will push each other away.
- Unlike charges attract : Two objects with opposite charges (e.g., a negatively charged balloon and the positively charged woolen cloth) will pull towards each other.
- A charged object can also attract an uncharged object, like a charged comb attracting small pieces of paper.

NODIA

179. What effects can a force have on an object? Elaborate on the four main effects with examples.

Ans :

A force applied to an object can produce several effects, changing its state of motion or its physical form. The four main effects are:

Make an object move from rest :

A stationary object will begin to move only when a force is applied. For example, kicking a football that is on the ground causes it to move.

Change the speed of a moving object :

A force can either increase or decrease the speed of an object already in motion. Applying brakes on a moving bicycle is a force that decreases its speed.

Change the direction of motion :

A force can alter the path of a moving object. For instance, when a cricket batsman hits a moving ball, the force from the bat changes the ball's direction.

Change the shape of an object :

Applying force can deform an object. For example, pressing an inflated balloon with your hands changes its shape, and stretching a rubber band makes it longer.

180. A large ship made of steel floats on water. Identify all the forces acting on it and explain why it floats.

Ans :

There are two primary forces acting on a floating ship. A detailed explanation involves Archimedes' Principle.

Forces Acting on the Ship:

- Gravitational Force (Weight) : The Earth exerts a downward pull on the entire mass of the ship. This force acts through the ship's center of gravity.
- Buoyant Force (Upthrust) : The water exerts an upward force on the submerged part of the ship's hull. This force is distributed over the entire submerged surface area.

Explanation for Floating:

- According to Archimedes' Principle, the buoyant force is equal to the weight of the water displaced by the ship.
- Although the ship is made of dense steel, its hull is shaped to be hollow, which allows it to displace a very large volume of water.
- This massive volume of displaced water has a significant weight, creating a powerful upward buoyant force.
- The ship floats because this buoyant force is strong enough to perfectly balance the ship's total downward weight.

181. Analyze the different forces at play when a cyclist rides uphill on a rough road against the wind.

Ans :

A cyclist riding uphill against the wind must overcome several opposing forces, requiring a significant application of muscular force.

Driving Force:

Muscular Force : The cyclist applies a muscular force to push the pedals, which drives the bicycle forward. This is the primary force for motion.

Opposing Forces:

- Gravitational Force : When moving uphill, a component of the Earth's gravitational force acts down the slope, directly opposing the cyclist's forward motion and pulling the bike backward.
- Frictional Force : There is friction between the tires and the rough road surface. This force also opposes the forward motion of the bicycle.
- Air Resistance : The force of the wind pushing against the cyclist is a form of friction from the air that opposes their forward movement.

Conclusion :

The cyclist must exert a large muscular force to overcome the combined resistance from gravity, road friction, and air resistance to continue moving uphill.

182. Design a simple experiment to demonstrate that the force of friction depends on the nature of the surfaces.

Ans :

This experiment aims to show that rougher surfaces produce more friction than smoother ones.

Materials Required:

1. An empty lunch box or a flat-based object.
2. A smooth, flat tabletop.
3. A piece of cloth or a towel large enough to cover part of the tabletop.
4. A ruler or measuring tape.

Procedure:

1. Place the smooth tabletop in an open area. Mark a starting line on it.
2. Place the lunch box at the starting line and give it a gentle, consistent push.

Downloaded from www.pdf.tube

3. Observe the distance the lunch box travels before it comes to a stop. Measure this distance with the ruler.
4. Now, spread the piece of cloth flat on the tabletop.
5. Place the lunch box at the same starting line on the cloth and give it the exact same gentle push as before.
6. Observe and measure the distance it travels on the cloth before stopping.

Expected Observation :

The lunch box will travel a much shorter distance on the cloth compared to the smooth tabletop. This shows that the frictional force exerted by the rougher cloth surface is greater than that of the smoother table surface.

183. Compare and contrast the gravitational force causing a stone to fall and the magnetic force lifting an iron nail.

Ans :

Both gravitational and magnetic forces are non-contact forces, but they have distinct differences.

Similarities:

- Non-Contact Nature : Both forces can act on objects from a distance without any physical touch. The Earth pulls the stone, and the magnet pulls the nail without contact.
- Force as a Pull : In these specific examples, both forces are acting as a pull or an attractive force.

Differences:

- Nature of Force : Gravitational force is always attractive; it only pulls objects together. Magnetic force, however, can be both attractive (unlike poles) and repulsive (like poles).
- Objects Affected : Gravitational force acts on all objects that have mass. Magnetic force only acts on other magnets and specific magnetic materials like iron. It would have no effect on non-magnetic objects like wood or plastic.
- Strength : The magnetic force from a small magnet can be strong enough to overcome the Earth's entire gravitational pull on a small nail, demonstrating its potential strength over short distances.

184. Explain how you would use a spring balance to find the weight of two different objects, like a stone and a pencil box.

Ans :

A spring balance is used to measure weight by observing the extension of a spring. The process involves calibration and measurement.

Understanding the Scale:

1. First, observe the scale on the spring balance. Identify its range (the maximum weight it can measure, e.g., 10 N).
2. Determine the value of the smallest division (least count). For instance, if the difference between 0 N and 1 N is divided into 5 smaller marks, then each mark represents 0.2 N.

Measurement Procedure:

1. Hold the spring balance vertically and ensure its pointer is at the zero mark before hanging any object.
2. Hang the stone from the hook at the bottom of the spring balance.
3. Allow the stone to hang freely until the pointer becomes steady.
4. Read the measurement on the scale where the pointer has stopped. This value is the weight of the stone in newtons.
5. Repeat the same procedure with the pencil box to find its weight.

Conclusion :

The different stretches produced by the stone and the pencil box will show that they have different weights, indicating the Earth pulls them with different forces.

NODIA

CASE BASED QUESTIONS

185. A student needs to move a heavy cardboard box. First, she pushes it, applying force to make it move from rest. Later, her friend helps by pulling it with a rope. In both situations, they realize that a push or a pull is needed to change the box's state of motion. This interaction between a person and the box is what science calls a force.

Questions:

1. In science, what is the general term for a push or a pull on an object?
2. When the student pushes the box, which two objects are interacting to create the force?
3. If the student pushes the moving box from the front, in the opposite direction of its motion, what effect will the force have?

Ans :

168. If you kick a stationary football, it moves. If you kick a moving football, its speed increases. Explain both scenarios.

Ans :

In the first scenario, the football is at rest. The force from the kick changes its state of motion from rest to moving. In the second scenario, the football is already moving. The force applied by the kick is in the same direction as the motion. This additional force causes the ball's speed to increase, demonstrating how force can change the speed of a moving object.

169. Two balloons hanging near each other move apart after both are rubbed with a woolen cloth. Explain this phenomenon.

Ans :

This phenomenon is due to electrostatic force. The explanation is as follows:

- Rubbing each balloon with the woolen cloth gives both balloons the same type of static charge.
- According to the principles of electrostatics, like charges repel each other.
- This repulsive force pushes the two similarly charged balloons away from each other.

170. Why is it scientifically important to distinguish between mass and weight?

Ans :

It is scientifically important because mass and weight are fundamentally different concepts. Mass is an intrinsic property of an object—the amount of matter it contains. Weight is an external force acting on that mass due to gravity. This distinction is crucial in fields like physics and astronomy, where gravity can vary significantly, such as comparing an object's properties on Earth versus the Moon.

171. To stop a moving bicycle, you apply brakes. Describe the forces involved in this action.

Ans :

When you apply the brakes on a bicycle, the following forces are involved:

- Your muscular force squeezes the brake levers.
- This action causes the brake pads to press against the wheel rims.
- This creates a strong frictional force between the pads and the rims, which opposes the rotation of the wheels and slows the bicycle down.

172. How does the story of Sonali and Ragini's cycle ride illustrate various effects of force?

Ans :

The story illustrates several effects of force. The wind pushing against them shows force opposing motion. Pedaling harder to move against the wind demonstrates applying force to change speed. Turning the handles to change direction shows force altering the path of motion. Finally, the bicycles speeding up downhill without pedaling illustrates the effect of gravitational force.

173. A spring balance shows an object's weight is 10 N on Earth. What is its mass? What would it weigh on Mars (gravity 3.8 N/kg)?

Ans :

To find the mass, we use the fact that an object with a mass of 1 kg weighs approximately 10 N on Earth.

- The object's mass is 1 kg.
- On Mars, its weight would be its mass multiplied by Mars's gravitational force : 1 kg 3.8 N/kg = 3.8 N.

174. When you stretch a rubber band, its shape changes. Explain the forces involved.

Ans :

When you pull on a rubber band, you are applying a muscular force that stretches it and changes its shape. This demonstrates one of the key effects of force. The rubber band itself exerts an opposing force, trying to return to its original shape. When you release your pull, this internal force of the band causes it to snap back to its original form.

LONG ANSWER QUESTIONS

175. Explain the two main categories of forces, contact and non-contact, providing two specific examples for each category with definitions.

Ans :

The two main categories of forces are contact and non-contact forces, distinguished by whether physical touch is required.

Contact Forces :

These forces act only when objects are in direct physical contact.

Click Here to Buy book on Amazon

1. It is called the gravitational force, or gravity.
2. It is a non-contact force because it acts on objects from a distance without any physical contact.
3. Gravitational force is always an attractive force, whereas magnetic and electrostatic forces can be either attractive or repulsive.

190. A student uses a spring balance to measure different objects. She hangs a small stone and the scale reads 5 N. She then hangs a heavier book and the scale reads 12 N. The readings show the gravitational force pulling each object down. The student learns that this force is called the object's weight, which is measured in newtons (N).

Questions:

1. What is the SI unit of weight?
2. What force is actually being measured by the spring balance when an object is hung from it?
3. If the student took the same stone and spring balance to the Moon, where gravity is weaker, would the reading be the same, more, or less than 5 N?

Ans :

1. The SI unit of weight is the newton (N).
2. The spring balance is measuring the weight of the object, which is the force with which the Earth pulls it.
3. The reading would be less than 5 N because the Moon's gravitational pull is weaker than Earth's, so the weight of the stone would be less.

191. A science chart shows that an object with a mass of 1 kg on Earth also has a mass of 1 kg on Jupiter. However, its weight on Earth is about 10 N, while its weight on Jupiter is about 25.4 N. This illustrates that mass, the amount of matter in an object, is constant, while weight can change depending on the gravitational force.

Questions:

1. What is the difference between mass and weight?
2. Why is the object's weight greater on Jupiter than on Earth?
3. If an astronaut has a mass of 70 kg on Earth, what will her mass be on the Moon?

Ans :

1. Mass is the amount of matter in an object and is constant, while weight is the gravitational force on the object and can vary.
2. The object's weight is greater on Jupiter because Jupiter's gravitational force is much stronger than Earth's.
3. Her mass will still be 70 kg, because mass remains the same everywhere.

192. A student pushes an empty, tightly-capped plastic bottle into a bucket of water. She feels an upward push from the water. When she releases the bottle, it bounces back to the surface and floats. This upward force exerted by the liquid is called the buoyant force or upthrust, and it acts in the opposite direction to the gravitational force.

Questions:

1. What is the upward force applied by a liquid on an object called?
2. What two forces are acting on the bottle when it is in the water?
3. Why does the empty bottle float instead of sink?

Ans :

1. The upward force is known as upthrust or buoyant force.
2. The two forces are the downward gravitational force and the upward buoyant force.
3. The bottle floats because the upward buoyant force is equal to the downward gravitational force.

193. In a cricket match, a fielder catches a fast-moving ball. As the ball hits his hands, he pulls his hands back in the direction of the ball's motion. This action shows the application of force to change the speed of a moving object. By pulling his hands back, the fielder increases the time over which the ball's speed is reduced to zero.

Questions:

1. What effect of force is demonstrated when a fielder stops a ball?
2. Which type of force (contact or non-contact) is the fielder applying to the ball?
3. Why is it more effective and less painful for the fielder to pull his hands back while catching the ball?

Ans :

1. The force is changing the speed of a moving object, bringing it to a stop.
2. The fielder is applying a contact force, specifically a muscular force.
3. By pulling his hands back, he is applying a force to slow the ball down over a longer period. This gradual change in speed is more effective than trying to stop it abruptly.

Downloaded from www.pdf.tube

(A) Has a smaller area of contact, which greatly increases the pressure

For a given force from a hammer, pressure is inversely proportional to the area of application. The small area of the pointed tip concentrates the force, creating a very high pressure that allows the nail to easily penetrate the wood.

18. Why are overhead water tanks in a locality usually placed at a height?

(A) To keep the water inside the tank consistently cool.

(B) To increase the pressure of the water in the taps below.

(C) To protect the water from various forms of contamination.

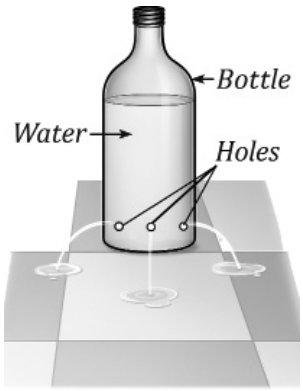
(D) Because there is often no available space on the ground.

Ans :

(B) To increase the pressure of the water in the taps below.

The pressure exerted by a liquid increases with the height of its column (depth). Placing the water tank at a significant height creates a large vertical column of water, which results in higher pressure in the pipes and a strong flow from the taps.

19. In the shown figure water flows out from four holes made at the same height near the bottom of a bottle. What does this observation demonstrate?



Liquid exerts pressure on the wall of the container

(A) Liquids exert pressure only at the bottom of a container.

(B) The pressure of a liquid decreases with depth.

(C) Liquids exert pressure on the sides of a container.

(D) Water can only flow downwards.

Ans :

(C) Liquids exert pressure on the sides of a container.

The fact that water jets out from the holes on the sides proves that the liquid is exerting an outward force, or pressure, on the walls of the container. It also shows the pressure is equal at the same depth.

20. How does the pressure exerted by a liquid change with the height of the liquid column?

(A) The pressure decreases as the height increases.

(B) The pressure is not affected by the height.

(C) The pressure is highest at the top and lowest at the bottom.

(D) The pressure increases as the height increases.

Ans :

(D) The pressure increases as the height increases.

The pressure at any point within a liquid is due to the weight of the liquid column above that point. Therefore, as the depth or height of the liquid column increases, the weight of the water above increases, resulting in greater pressure.

21. What is the envelope of air that surrounds the Earth called?

(A) Atmosphere (B) Hydrosphere

(C) Lithosphere (D) Ionosphere

Ans :

(A) Atmosphere

The atmosphere is the layer of gases that surrounds our planet. It is held in place by Earth's gravity and is essential for life, providing the air we breathe and protecting us from solar radiation.

22. Why does a rubber sucker stick firmly to a smooth, flat surface when pressed against it?

(A) A very sticky type of glue is secreted by the rubber.

(B) The rubber creates a perfect vacuum with a strong pulling force.

(C) The sucker becomes a temporary, but powerful, magnet.

(D) The outside air pressure is greater than the pressure inside.

Ans :

(D) The outside air pressure is greater than the pressure inside.

Pressing the sucker pushes out most of the air underneath it, creating a region of lower pressure. The higher atmospheric pressure on the outside then pushes the sucker firmly against the surface, holding it in place.

NODIA

After hanging the box, she carefully reads the pointer on the scale, which shows 3.4 N.

Questions:

1. What does a spring balance directly measure : mass or weight?
2. What causes the spring inside the balance to stretch when the pencil box is hung from it?
3. The scale of the spring balance also shows markings for mass in grams. Why are these markings only accurate for use on Earth?

Ans :

1. A spring balance is a device used to measure weight (force).
2. The spring stretches due to the force of gravity (weight) applied by the Earth on the pencil box.
3. The mass markings are calibrated based on the Earth's specific gravitational force. On other planets with different gravity, the same mass would produce a different weight (stretch), making the mass scale inaccurate.

199. A book is resting on a table. A student observes that no force seems to be acting on it, as it is not moving. However, his teacher explains that for a force to come into play, at least two objects must interact. A magnet lying alone on the table exerts no force until an iron clip is brought nearby, initiating an interaction.

Questions:

1. What is the minimum number of objects that must interact for a force to come into play?
2. When a magnet pulls an iron clip, what are the two objects that are interacting?
3. When you stand on the floor, you are interacting with the Earth via gravitational force. What is the other major force interaction happening, and is it a contact or non-contact force?

Ans :

1. At least two objects must interact.
2. The two interacting objects are the magnet and the iron clip.
3. Your feet are interacting with the floor. This involves a contact force, as your feet must be in physical contact with the floor to push against it.

****

Click Here to Buy book on Amazon

will be equal, causing them to bulge to the same extent.

8. Explain how a storm becomes a cyclone.

Ans :

A storm can develop into a cyclone under specific conditions, typically over warm ocean waters.

1. As ocean water gets heated, the warm, moist air above it rises, creating a low-pressure area.
2. As this moist air rises, it cools, and the water vapour condenses to form raindrops, which releases heat into the atmosphere.
3. This released heat warms the air further, making it rise even faster and creating an even lower pressure area.
4. Air from the surrounding high-pressure regions rushes in to fill the low-pressure area.
5. The rotation of the Earth causes this moving air to spin.

This cycle repeats, creating a large, spinning system of clouds and high-speed winds revolving around a central low-pressure area, which is known as a cyclone.

9. Figure shows trees along the sea coast in a summer afternoon. Identify which side is land - A or B. Explain your answer.

Ans :

Side B is land.

During a summer afternoon, the land heats up faster than the sea. The air above the land becomes warm and rises, creating an area of low pressure. The air over the sea is cooler and has higher pressure. Wind blows from the region of high pressure (the sea) to the region of low pressure (the land). This is called a sea breeze. In the figure, the trees are bent towards side B, which indicates that the wind is blowing from side A to side B. Therefore, A is the sea and B is the land.

10. Describe an activity to show that air flows from a region of high pressure to a region of low pressure.

Ans :

To show that air flows from a region of high pressure to a region of low pressure, we can perform the following activity:

1. Take two similar balloons and a drinking straw.
2. Inflate one balloon fully. The air pressure inside this balloon is high. The other balloon remains uninflected, having low pressure inside.
3. Connect the two balloons using the drinking straw, securing the ends tightly so that air does not leak.
4. We will observe that air from the inflated (high-pressure) balloon moves into the uninflected (low-pressure) balloon, causing the first balloon to shrink and the second one to inflate.
5. The air stops flowing when the pressure in both balloons becomes equal.

This activity concludes that air moves from a region of high air pressure to a region of low air pressure.

11. What is a thunderstorm? Explain the process of its formation.

Ans :

A thunderstorm is a storm that is accompanied by lightning and thunder.

Formation Process:

1. In hot and humid areas, warm, moist air near the ground gets heated and rises, creating a low-pressure area.
2. Cooler air from surrounding areas rushes in to take its place. This cycle of rising warm air and incoming cool air creates strong wind currents.
3. As the warm air rises, it cools, and the water vapour condenses to form clouds. Water droplets merge and fall as rain.
4. Strong upward and downward movements of wind cause water droplets and ice particles within the clouds to rub against each other, creating static electric charges.
5. The discharge of these electric charges produces lightning and the sound of thunder, resulting in a thunderstorm.

12. Explain the process that causes lightning.

Ans :

NODIA

3. STORMS AND THUNDERSTORMS

3.1 How Thunderstorms Form

1. A storm is defined as strong winds accompanied by rain. A thunder storm is a storm that also includes lightning and thunder.
2. They form when warm, moist air rises quickly, creating a low-pressure area.
3. As the air rises, it cools, and the moisture condenses to form clouds and eventually rain. This process creates strong, circulating winds.

3.2 Lightning and Thunder

1. Inside storm clouds, strong upward and downward winds cause water droplets and ice particles to rub against each other, building up static electric charges.
2. Typically, positive charges gather at the top of the cloud and negative charges at the bottom.
3. Lightning is the bright flash of light created when there is a massive electrical discharge between oppositely charged areas—within a cloud, between clouds, or between a cloud and the ground.
4. Thunder is the loud sound produced when the lightning flash rapidly heats the surrounding air, causing it to expand suddenly.

3.3 Safety During a Thunderstorm

1. Lightning is dangerous and can damage property and cause injury or death.
2. During a thunderstorm, it is safest to be inside a car or building. If outdoors, find a low-lying area and avoid tall objects.
3. A lightning conductor is a metal rod installed on buildings to provide a safe path for lightning's electric charge to travel to the ground.

4. CYCLONES

4.1 Formation of a Cyclone

A cyclone is a large, rotating storm system that forms over warm ocean waters.

The formation process involves a repeating cycle:

1. Warm, moist air over the ocean rises, creating an area of very low pressure.
2. As the air rises and cools, water vapor condenses, releasing heat, which warms the air more and makes it rise even faster.
3. Air from surrounding high-pressure areas rushes in toward the low-pressure center.
4. The rotation of the Earth causes this moving air to spin, forming the characteristic cyclonic vortex.
5. The center of the cyclone is a calm, low-pressure area known as the eye.

4.2 Structure and Destructive Effects

Cyclones cause destruction through three main factors:

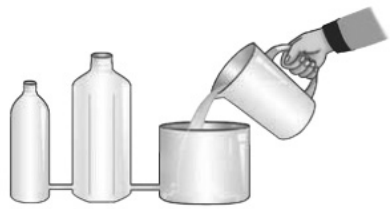
1. High-speed winds : Can damage buildings, trees, and infrastructure.
2. Heavy rainfall : Leads to widespread flooding and landslides.
3. Storm surge : A large wall of seawater pushed onto the shore by the cyclone's winds, which can flood coastal areas.

Modern weather satellites help meteorologists (like the IMD in India) track cyclones, allowing for timely warnings that save lives and property.

NCERT EXERCISE

1. Choose the correct statement.

(i) Look at Figure carefully. Vessel R is filled with water. When pouring of water is stopped, the level of water will be



(a) The highest in vessel P
(b) The highest in vessel Q
(c) The highest in vessel R
(d) Equal in all three vessels

(ii) A rubber sucker (M) is pressed on a flat smooth surface and an identical sucker (N) is pressed on a rough surface:

(a) Both M and N will stick to their surfaces.
(b) Both M and N will not stick to their surfaces.
(c) M will stick but N will not stick.
(d) M will not stick but N will stick.

(iii) A water tank is placed on the roof of a building at a height 'H'. To get water with more pressure on the ground floor, one has to

Downloaded from www.pdf.tube

CHAPTER 6

PRESSURE, WINDS, STORMS AND CYCLONES

SUMMARY

1. UNDERSTANDING PRESSURE

1.1 Definition and Formula

Pressure is defined as the force applied per unit area. The formula for pressure is:

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

For the same amount of force, the pressure is higher when the area is smaller. This is why sharp knives cut better and bags with broad straps are more comfortable than those with narrow straps. The SI unit of pressure is newton per square metre (N/m^2), which is also called a pascal (Pa).

Figure 6.2: Buckets with broad and narrow handles

1.2 Pressure in Liquids

1. Liquids exert pressure on the bottom and sides of their container.
2. The pressure exerted by a liquid increases with the height (or depth) of the liquid column.
3. This is why water tanks are placed at a height to increase the water pressure in taps.
4. It is also why the base of a dam is built much broader than its top—to withstand the greater pressure of the water at the bottom.

Download INDIA's Best Study app NODIA

1.3 Atmospheric Pressure

The envelope of air surrounding the Earth is called the atmosphere. The pressure exerted by this air is known as atmospheric pressure.

Air exerts pressure on all objects in all directions.

We are not crushed by the high atmospheric pressure because the pressure inside our bodies is equal to the atmospheric pressure, which balances it out.

2. WIND FORMATION

2.1 The Principle : Pressure Difference

Wind is essentially moving air. Air moves from a region of high air pressure to a region of low air pressure. Differences in air pressure are the primary cause of wind. For example, during the day, land heats up faster than the sea, creating a low-pressure area over the land. Air from the high-pressure area over the sea then blows towards the land, creating a sea breeze.

2.2 High-Speed Winds and Reduced Pressure

A key principle of wind is that high-speed winds are accompanied by reduced air pressure. This is why roofs of houses can be blown off during storms. The fast-moving wind above the roof creates a low-pressure area, while the higher pressure inside the house pushes the roof upwards.

NODIA

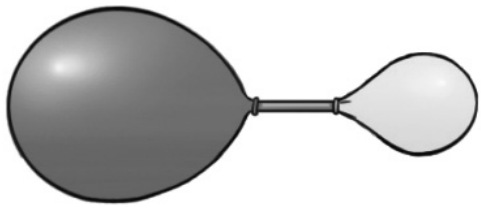


Figure 6.12: Air moves from a high pressure region to a low pressure region

(i) The boy will sink more in sand when he is standing (Figure b).

Reason : Pressure is defined as force per unit area. The force, which is the boy's weight, is the same in both cases. When the boy is standing, this force acts on a smaller area (the area of his feet). This results in higher pressure on the sand, causing him to sink more. When he is lying down, the same force is distributed over a larger area, resulting in lower pressure.

4. An elephant stands on four feet. If the area covered by one foot is $0.25\ m^2$, calculate the pressure exerted by the elephant on the ground if its weight is 20000 N.

Ans :

Given:
Weight of the elephant (Force, F) = 20000 N
Area of one foot = $0.25\ m^2$
Total area covered by four feet (Area, A)

$$A = 4 \times 0.25\ m^2 = 1.0\ m^2$$

We know that,

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$= \frac{20000\ N}{1.0\ m^2}$$

$$= 20000\ N/m^2 \text{ or } 20000\ Pa$$

The pressure exerted by the elephant on the ground is 20000 Pa.

5. There are two boats, A and B. Boat A has a base area of $7\ m^2$ and 5 persons are seated in it. Boat B has a base area of $3.5\ m^2$, and 3 persons are seating in it. If each person has a weight of 700 N, find out which boat will experience more pressure on its base and by how much?

Ans :

For Boat A:
Total weight (Force)

$$= 5 \text{ persons} \times 700\ N/\text{person} = 3500\ N$$

$$\text{Base Area} = 7\ m^2$$

$$\text{Pressure on Boat A} = \frac{\text{Force}}{\text{Area}} = \frac{3500\ N}{7\ m^2} = 500\ N/m^2$$

For Boat B:
Total weight (Force)

$$= 3 \text{ persons} \times 700\ N/\text{person} = 2100\ N$$

$$\text{Base Area} = 3.5\ m^2$$

$$\text{Pressure on Boat B} = \frac{\text{Force}}{\text{Area}} = \frac{2100\ N}{3.5\ m^2} = 600\ N/m^2$$

Conclusion : Boat B will experience more pressure on its base.
Difference in pressure = Pressure on Boat B – Pressure on Boat A

$$= 600\ N/m^2 - 500\ N/m^2 = 100\ N/m^2.$$

Boat B experiences $100\ N/m^2$ (or 100 Pa) more pressure than Boat A.

6. Would lightning occur if air and clouds were good conductors of electricity? Give reasons for your answer.

Ans :

No, lightning would not occur if air and clouds were good conductors of electricity.
Reason :
Lightning is caused by a massive discharge of electrical energy. This happens because air normally acts as an electrical insulator, allowing a very large buildup of opposite electric charges within clouds or between clouds and the ground. If air and clouds were good conductors, these charges would flow and neutralize each other continuously, preventing the large charge separation needed to cause lightning.

7. What will happen to the two identical balloons A and B as shown in Figure when water is filled into the bottle up to a certain height. Will both the balloons bulge? If yes, will they bulge equally? Explain your answer.

Ans :

Yes, both balloons will bulge, and they will bulge equally.
Liquids exert pressure on the walls of the container. The pressure exerted by a liquid at any point depends on the height of the liquid column above that point. Since the outlets to both balloons are at the same height from the bottom, the height of the water column above them will be identical. Therefore, the pressure exerted on both balloons

Click Here to Buy book on Amazon

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

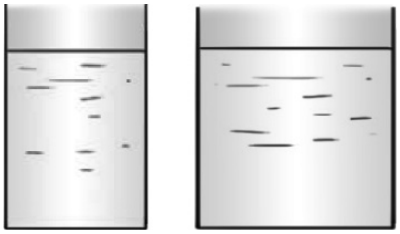
Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

(a) Increase the height 'H' at which the tank is placed.
(b) Decrease the height 'H' at which the tank is placed.
(c) Replace the tank with another tank of the same height that can hold more water.
(d) Replace the tank with another tank of the same height that can hold less water.

(iv) Two vessels, A and B contain water up to the same level as shown in Figure P_A and P_B is the pressure at the bottom of the vessels. F_A and F_B is the force exerted by the water at the bottom of the vessels A and B.



A B

(a) $P_A = P_B, F_A = F_B$
(b) $P_A = P_B, F_A < F_B$
(c) $P_A < P_B, F_A = F_B$
(d) $P_A > P_B, F_A > F_B$

Ans :

(i)
(d) equal in all three vessels
Liquids exert pressure that depends on the height of the liquid column. In connected vessels, water will flow until the pressure is equal at the same depth, resulting in the same water level in all three vessels.

Download INDIA's Best Study app NODIA

(ii)
(c) M will stick but N will not stick.
When a sucker is pressed on a smooth surface, most of the air between its cup and the surface is pushed out. The sucker sticks because the atmospheric pressure outside is higher than the pressure inside. A rough surface will not allow a proper seal, so air will not be pushed out effectively, and it will not stick.
(iii)
(a) increase the height 'H' at which the tank is placed.
The pressure exerted by a liquid increases as the height of its column increases. Therefore, placing the tank at a greater height will result in greater pressure in the taps.

(iv)
(b) $P_A = P_B, F_A < F_B$
The pressure exerted by a liquid depends only on the height of its column. Since the water level is the same in both vessels, the pressure at the bottom is equal ($P_A = P_B$). Force is calculated as Pressure multiplied by Area. Since the base area of vessel B is larger than vessel A, the force on the bottom of B is greater ($F_A < F_B$).

NODIA

2. State whether the following statements are True [T] or False [F].
(i) Air flows from a region of higher pressure to a region of lower pressure. [ ]
(ii) Liquids exert pressure only at the bottom of a container. [ ]
(iii) Weather is stormy at the eye of a cyclone. [ ]
(iv) During a thunderstorm, it is safer to be in a car. [ ]

Ans :

(i) [T] True. Air moves from a region of high air pressure to a region of low air pressure.
(ii) [F] False. Liquids exert pressure not only at the bottom of the container, but also on its sides.
(iii) [F] False. At the eye of the cyclone, the wind is calm.
(iv) [T] True. During lightning, if you are inside a bus or a car, you are comparatively safer.

3. Figure (a) shows a boy lying horizontally, and Figure (b) shows the boy standing vertically on a loose sand bed. In which case does the boy sink more in sand? Give reasons.

(a)

(b)

Ans :

Lightning is caused by the discharge of static electricity built up in clouds. The process is as follows:

1. During the formation of a thunderstorm, strong winds moving upwards and downwards cause ice particles and water droplets to rub against each other. This rubbing action generates static electric charges.
2. A charge separation occurs within the clouds. The lighter, positively charged particles move to the upper part of the clouds, while the heavier, negatively charged droplets settle in the lower part.
3. The ground below a negatively charged cloud becomes positively charged.
4. Air is normally an insulator, but when the build-up of opposite charges becomes very large, the insulating property of air breaks down.
5. A sudden, massive flow of electric charge takes place between the positive and negative regions (within a cloud, between two clouds, or between a cloud and the ground). This discharge appears as a bright flash of light called lightning.

13. Explain why holes are made in banners and hoardings.

Ans :

High-speed winds are accompanied by reduced air pressure. When strong wind blows, it creates a low-pressure area on one side of a banner or hoarding. The air pressure on the other side remains higher. This difference in pressure creates a large force that can damage or tear the banner. Making holes allows air to pass through from the high-pressure side to the low-pressure side. This helps to equalize the pressure on both sides of the banner, reducing the net force on it and preventing it from being blown away or getting damaged by the wind.

MULTIPLE CHOICE QUESTION

14. How is pressure defined in science?
(A) The force applied per unit area.
(B) The total force acting on a body.
(C) The area over which a force is applied.
(D) The speed at which a force is applied.

Ans :

(A) The force applied per unit area.
Pressure is a measure of how concentrated a force is. It is calculated by dividing the magnitude of the force that acts perpendicular to a surface by the area over which the force is distributed.

NODIA

15. Why does a school bag with broad straps feel more comfortable to carry than one with narrow straps, assuming both have the same weight?
(A) Broad straps are made of a much lighter material.
(B) Narrow straps are typically made of a harder, less flexible material.
(C) Broad straps actually increase the total weight of the school bag.
(D) Broad straps increase the area, reducing pressure on the shoulders.

Ans :

(D) Broad straps increase the area, reducing pressure on the shoulders.
The weight of the bag exerts a force on the shoulders. Broad straps distribute this force over a larger area, which results in lower pressure. This reduced pressure makes the bag feel more comfortable to carry.

16. What is the SI unit of pressure, which is also known as a newton per square meter (N/m^2)?
(A) Joule (J)
(B) Watt (W)
(C) Pascal (Pa)
(D) Newton (N)

Ans :

(C) Pascal (Pa)
The standard international unit for pressure is the pascal, named after Blaise Pascal. One pascal is defined as the pressure exerted by a force of one newton acting on an area of one square meter.

17. When driving a nail into a wooden plank, it is easier to use the pointed end rather than the flat head. This is because the pointed end _____.
(A) Has a smaller area of contact, which greatly increases the pressure
(B) Is made of a much stronger and more durable type of metal
(C) Weighs significantly more than the flat head of the nail
(D) Reduces the overall force of friction against the wooden plank

Ans :

194. A baker takes a ball of dough and presses it flat to make a chapati. His child plays with a piece of dough, squeezing it and changing its shape in various ways. Both actions demonstrate one of the key effects of applying a force. The force exerted by their hands is not changing the dough's motion, but it is changing its shape.

Questions:

1. Besides changing motion, what other effect can a force have on an object?
2. Identify the type of force the baker is using to flatten the dough.
3. If you press an inflated balloon between your hands, its shape changes. What happens to the shape when you stop applying the force?

Ans :

1. A force can bring about a change in the shape of an object.
2. The baker is using muscular force, which is a type of contact force.
3. The balloon returns to its original shape, showing that the change in shape was temporary while the force was being applied.

195. Animals like bullocks are used to plough fields, applying their muscular force to pull the heavy plough through the soil. Similarly, a horse applies muscular force to pull a cart and transport people. These examples show how the force resulting from the action of muscles, a type of contact force, has been used to carry out various essential tasks.

Questions:

1. What is the force resulting from the action of muscles known as?
2. Is the muscular force exerted by the bullocks a push or a pull?
3. The muscular force is also important inside our bodies. Name one internal process that relies on this force.

Ans :

1. It is known as muscular force.
2. The bullocks are applying a pull on the plough.
3. The process of digestion, where food is pushed through the alimentary canal, or the circulation of blood by the heart muscles, relies on muscular force.

196. After combing his dry hair, a student brings his plastic comb near some tiny pieces of paper. The paper pieces jump up and stick to the comb without him even touching them. This happens because rubbing the comb on his hair gave it a static electrical charge, which then exerted an attractive electrostatic force on the uncharged paper pieces.

Questions:

1. What is an object that acquires static charges said to be?
2. Why is the electrostatic force considered a non-contact force in this scenario?
3. Why was it important for the student's hair to be dry for this effect to work well?

Ans :

1. The object is said to be a charged object.
2. It is a non-contact force because the force comes into play even when the comb and the paper are not in contact.
3. Moisture in the air or hair can cause the static charges to dissipate quickly, preventing a strong enough charge from building up on the comb to attract the paper.

197. A cyclist finds it much harder to pedal uphill compared to riding on a flat road. To move uphill, she has to apply a strong muscular force to overcome two opposing forces : the force of friction between the tires and the road, and the component of the gravitational force that is pulling her and the bicycle downwards along the slope.

Questions:

1. Name the two main contact forces involved in cycling.
2. Which non-contact force makes cycling uphill more difficult than cycling on a flat surface?
3. When the cyclist is coming downhill, she can move at a great speed without pedalling. Why?

Ans :

1. The two main contact forces are muscular force (from pedalling) and frictional force.
2. The gravitational force pulls the cyclist and bicycle downwards, making it harder to move up the slope.
3. When coming downhill, the force of gravity pulls her and the bicycle down the slope, causing them to accelerate without the need for pedalling.

198. A student wants to measure the weight of her pencil box. She uses a spring balance from her school lab. Before hanging the box, she notes that the smallest value the balance can read is 0.2 N.

Downloaded from www.pdf.tube

23. Why are we not crushed by the large atmospheric pressure acting on our bodies?

(A) Our bodies are made of materials that are immune to pressure.

(B) The pressure inside our bodies balances the pressure from outside.

(C) The force of gravity pushes upwards, cancelling the pressure.

(D) Atmospheric pressure only acts upon non-living objects.

Ans :

(B) The pressure inside our bodies balances the pressure from outside.

The fluids and gases within our bodies exert an outward pressure. This internal pressure is approximately equal to the external atmospheric pressure. These balanced forces prevent us from being crushed by the weight of the air.

Download INDIA's Best Study app NODIA

24. What is the fundamental cause of winds?

(A) Differences in air pressure.

(B) The rotation of the Earth.

(C) The gravitational pull of the Moon.

(D) The magnetic field of the Earth.

Ans :

(A) Differences in air pressure.

Wind is simply the movement of air from one region to another. This movement is driven by the natural tendency of air to flow from an area of higher atmospheric pressure to an area of lower atmospheric pressure.

25. High-speed winds blowing over the weak roof of a house can cause the roof to be blown away. This happens because the high-speed wind creates _____.

(A) A high-pressure area above the roof

(B) A vacuum above the roof

(C) A low-pressure area above the roof

(D) A strong downward force on the roof

Ans :

(C) A low-pressure area above the roof

According to Bernoulli's principle, fast-moving fluids (like air) exert lower pressure. The high-speed wind creates a low-pressure zone above the roof, while the still air inside is at a higher pressure. This pressure difference results in a net upward force that can lift the roof.

NODIA

26. What is a storm that is accompanied by lightning and thunder called?

(A) A cyclone

(B) A breeze

(C) A tornado

(D) A thunderstorm

Ans :

(D) A thunderstorm

A thunderstorm is a specific type of storm characterized by the presence of lightning and its acoustic effect, thunder. It is formed by a combination of moisture, unstable rising air, and a lifting mechanism.

27. What causes the loud sound of thunder during a thunderstorm?

(A) The direct collision of two very large storm clouds.

(B) The rapid heating and expansion of air by lightning.

(C) The loud sound of heavy rain hitting the ground.

(D) Strong winds breaking the sound barrier as they move.

Ans :

(B) The rapid heating and expansion of air by lightning.

A lightning strike is incredibly hot, and it heats the air in its path almost instantaneously. This causes the air to expand explosively, creating a powerful shockwave that travels through the atmosphere and is heard as thunder.

28. What is the purpose of a lightning conductor installed on a tall building?

(A) To provide a safe path for a lightning strike's charge to the ground.

(B) To attract lightning strikes for the purpose of energy generation.

(C) To prevent storm clouds from forming directly over the building.

(D) To make the building much more visible during a severe storm.

Ans :

(A) To provide a safe path for a lightning strike's charge to the ground.

A lightning conductor is a metal rod that intercepts a lightning strike. It provides a low-resistance path for the immense electrical current to follow safely down into the earth, thereby protecting the building from damage or fire.

77. Why do porters who carry heavy loads on their heads often place a round piece of cloth (a turban or pagri) on their head first?
(A) To keep their head warm.
(B) To increase the area of contact and reduce the pressure on their head.
(C) It is a traditional custom with no scientific reason.
(D) To increase the friction so the load does not slip.

Ans :

(B) To increase the area of contact and reduce the pressure on their head.
The round cloth significantly increases the surface area over which the weight of the load is distributed. By spreading the force over a larger area, it greatly reduces the pressure exerted on the head, making it more comfortable to carry the heavy load.

78. If the Earth stopped rotating, how would it affect the formation of cyclones?
(A) Cyclones would become stronger.
(B) It would have no effect on cyclone formation.
(C) Cyclones would still form but would not have a spinning motion.
(D) More cyclones would form over land.

Ans :

(C) Cyclones would still form but would not have a spinning motion.
The Earth's rotation (Coriolis effect) is what gives cyclones their characteristic spinning motion. While pressure differences would still cause air to move from high to low pressure, without rotation, this movement would be more direct and would not form a rotating storm.

79. How does a pressure cooker work?
(A) By increasing the pressure inside, which raises water's boiling point.
(B) By creating a low-pressure environment to cook the food slowly.
(C) By using the magnetic effect of electricity to directly heat the food.
(D) By reducing the effective force of gravity acting on the food.

Ans :

(A) By increasing the pressure inside, which raises water's boiling point.
A pressure cooker traps steam, which increases the pressure inside the pot. This higher pressure raises the boiling point of water above 100°C. Cooking at this higher temperature significantly speeds up the cooking process.

80. What is the approximate weight (in newtons) of an object with a mass of 225 kg on Earth?
(A) 225 N
(B) 22.5 N
(C) 2.25 N
(D) 2250 N

Ans :

(D) 2250 N
Weight is the force of gravity, calculated as mass times the acceleration due to gravity (approximately 10 m/s^2). Therefore, the weight is 225 kg $\times$ 10 m/s^2 = 2250 N.

81. You are using a straw to drink a soft drink. The liquid moves up the straw because _____.
(A) The plastic material of the straw actively pulls the liquid up.
(B) You create low pressure; atmospheric pressure pushes the drink up.
(C) The force of gravity works in reverse inside a narrow straw.
(D) The liquid is naturally attracted to the plastic of the straw.

Ans :

(B) You create low pressure; atmospheric pressure pushes the drink up.
When you suck on a straw, you remove air, reducing the pressure inside it. The normal atmospheric pressure pushing down on the surface of the drink in the glass is now greater than the pressure inside the straw, so it pushes the liquid up the straw into your mouth.

82. The vertical movement of warm, rising air and cool, sinking air in a continuous process is known as _____.
(A) A pressure gradient
(B) A wind shear
(C) A convection current
(D) An atmospheric tide

Ans :

(C) A convection current
A convection current is a cycle of movement in a fluid (like air or water) where warmer, less dense fluid rises and cooler, denser fluid sinks. This process is a fundamental mechanism for heat transfer in the atmosphere and drives many weather phenomena.

Click Here to Buy book on Amazon

35. How does lightning form within a storm cloud?
(A) Through a complex chemical reaction between water and the air.
(B) By the separation of static charges from rubbing ice and water.
(C) By the sun's powerful rays heating the top of the cloud.
(D) By the direct influence of the Earth's powerful magnetic field.

Ans :

(B) By the separation of static charges from rubbing ice and water.
Strong updrafts and downdrafts within a thunderstorm cause collisions between ice crystals and water droplets. This friction strips electrons, leading to a separation of charge where the top of the cloud becomes positively charged and the bottom becomes negatively charged.

36. What is the correct sequence of events in the formation of a sea breeze during the day?
(A) Land heats up → Low pressure on land → Wind blows from sea to land
(B) Sea air cools → Low pressure on sea → Wind blows from land to sea
(C) Land cools down → High pressure on land → Wind blows from land to sea
(D) Sea heats up → Low pressure on sea → Wind blows from sea to land

Ans :

(A) Land heats up → Low pressure on land → Wind blows from sea to land
During the day, land heats up faster than the sea. The warm air over the land rises, creating a low-pressure zone. The cooler, denser air over the sea (a high-pressure zone) then flows towards the land to replace the rising air, creating a sea breeze.

37. If a force of 100 N is applied on an area of 2 m^2, what is the pressure exerted?
(A) 200 Pa
(B) 102 Pa
(C) 50 Pa
(D) 98 Pa

Ans :

(C) 50 Pa
Pressure is calculated by the formula : Pressure = Force / Area. In this case, Pressure = 100 N / 2 m^2 = 50 N/m^2. Since 1 N/m^2 is equal to 1 Pascal (Pa), the pressure is 50 Pa.

38. Which of the following statements about cyclones is incorrect?
(A) They form over warm ocean waters.
(B) The wind is calm at the eye of the cyclone.
(C) They can cause flooding due to heavy rain and storm surge.
(D) They gain strength when they move over land.

Ans :

(D) They gain strength when they move over land.
Cyclones derive their energy from the warm, moist air over the ocean. When a cyclone moves over land, it is cut off from this energy source, causing it to weaken and eventually dissipate.

39. How does a thunderstorm differ from a cyclone?
(A) A thunderstorm has lightning, but a cyclone does not.
(B) Cyclones are much larger storms that form over oceans and have a spinning structure with an eye.
(C) A cyclone is just another name for a strong thunderstorm.
(D) Cyclones have only rain, while thunderstorms have only wind.

Ans :

(B) Cyclones are much larger storms that form over oceans and have a spinning structure with an eye.
While both are powerful storms, cyclones are significantly larger in scale, are defined by their rotating structure around a central eye, and form exclusively over warm ocean waters. Thunderstorms are more localized and can form over land.

40. When you blow hard between two balloons hanging close to each other, they move towards each other. Why?
(A) Fast-moving air between them creates a low-pressure area.
(B) The air you blow is magnetic and it pulls them together.
(C) Your breath is warm, and the heat makes the balloons attract.
(D) The sound of your blowing causes the balloons to vibrate.

Ans :

(A) Fast-moving air between them creates a low-pressure area.

NODIA

(A) The metal body of the car conducts the charge around the occupants.
The metal frame of a car acts as a Faraday cage. If struck by lightning, the electrical charge will travel along the outer metal surface and then jump to the ground, leaving the occupants inside unharmed.

53. A strong wind accompanied by rain, hail, or snow is best classified as a _____.
(A) Breeze
(B) Cyclone
(C) Storm
(D) Fog

Ans :

(C) Storm
A storm is a general term for a disturbance of the atmosphere that involves strong winds and is typically accompanied by some form of precipitation like rain, hail, or snow. Cyclones and thunderstorms are specific, more intense types of storms.

54. In which regions are thunderstorms more frequent?
(A) Cold, dry, polar regions.
(B) Temperate, coastal regions.
(C) High-altitude, mountainous regions.
(D) Hot, humid, tropical regions.

Ans :

(D) Hot, humid, tropical regions.
The formation of thunderstorms requires warm, moist, and unstable air. These conditions are most commonly found in hot and humid tropical areas like India, making these regions prone to frequent thunderstorm activity.

55. In a storm cloud, the positively charged lighter _____ particles move upwards, while the negatively charged heavier _____ droplets occupy the lower part.
(A) Water, ice
(B) Ice, water
(C) Dust, air
(D) Air, dust

Ans :

(B) Ice, water
Within a thundercloud, collisions during strong updrafts and downdrafts cause charge separation. Lighter, positively charged ice crystals are carried to the top of the cloud, while heavier, negatively charged water droplets or hail accumulate in the lower regions.

56. What causes the spinning motion of a cyclone?
(A) The Earth's rotation.
(B) The heat released during condensation.
(C) The high speed of the winds.
(D) The shape of the ocean basin.

Ans :

(A) The Earth's rotation.
As air rushes towards the low-pressure center of a developing cyclone, the rotation of the Earth deflects it. This effect, known as the Coriolis effect, imparts the characteristic spinning motion to the storm system.

57. An empty water bottle is sealed and taken from a high mountain to sea level. The bottle appears crushed. This is because the _____.
(A) Air pressure at sea level is much lower than on the mountain.
(B) Ambient temperature at sea level is significantly higher.
(C) Air pressure at sea level is higher than the pressure inside.
(D) The bottle's plastic material becomes weaker at sea level.

Ans :

(C) The air pressure at sea level is higher than the pressure inside.
Air pressure decreases with altitude. The bottle was sealed with low-pressure mountain air inside it. At sea level, the much higher external atmospheric pressure pushes inward on the bottle, causing it to buckle and appear crushed.

58. The force of gravity on an object of mass 225 kg is approximately 2250 N. This is equivalent to the force exerted by the atmosphere on an area of _____.
(A) 1 cm×1 cm
(B) 1 m×1 m
(C) 100 m×100 m
(D) 15 cm×15 cm

Ans :

(D) 15 cm×15 cm
The text provides this specific example to give an idea of the magnitude of atmospheric pressure. It states that the force exerted by the air column over an area of 15×15 cm is nearly equal to the weight of a 225 kg object.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

47. In the diagram of a dam , the arrows indicating horizontal pressure are shown to be larger near the bottom. This represents that _____.

(A) Water flows faster at the bottom
(B) The water pressure is greatest at the bottom
(C) The dam is weaker at the top
(D) There is more water at the bottom

Ans :

(B) The water pressure is greatest at the bottom
The diagram visually represents the principle that liquid pressure increases with depth. The longer, thicker arrows at the bottom signify a greater force per unit area (pressure) being exerted on the dam wall compared to the smaller arrows near the surface.

48. Which statement about the relationship between air temperature and pressure is incorrect?
(A) Rising warm air creates an area of high pressure.
(B) Warm air is lighter than cool air.
(C) When land gets heated, the air above it rises.
(D) Cooler air from surrounding areas flows in to take the place of rising warm air.

Ans :

(A) Rising warm air creates an area of high pressure.
When air is heated, it expands and becomes less dense (lighter). This lighter air rises, leaving behind an area of lower air pressure at the surface. High-pressure areas are associated with cooler, denser, sinking air.

49. A key difference between a land breeze and a sea breeze is _____.
(A) A sea breeze is stronger than a land breeze
(B) A land breeze brings rain, while a sea breeze does not
(C) The direction of wind flow and the time of day they occur
(D) A land breeze occurs over land, and a sea breeze occurs over the sea

Ans :

(C) The direction of wind flow and the time of day they occur
A sea breeze occurs during the day when wind blows from the cooler sea (high pressure) to the warmer land (low pressure). A land breeze occurs at night when the wind blows from the cooler land (high pressure) to the warmer sea (low pressure).

50. A large wall of water, 3-12 meters high, pushed towards the shore during a cyclone is known as a _____.
(A) Tsunami
(B) High tide
(C) Flash flood
(D) Storm surge

NODIA

Ans :

(D) Storm surge
The strong, persistent winds of a cyclone pile up ocean water and push it towards the coastline. This rise in sea level above the normal tide is called a storm surge, and it is one of the most destructive aspects of a cyclone, causing extensive coastal flooding.

51. The practical unit of air pressure often used by meteorologists, which is equal to 100 Pa, is the _____.
(A) Newton (N)
(B) Millibar (mb)
(C) Kilogram (kg)
(D) Atmosphere (atm)

Ans :

(B) Millibar (mb)
While the SI unit is the pascal, weather reports and meteorological charts commonly express atmospheric pressure in millibars (mb) or the equivalent hectopascals (hPa). Standard sea-level pressure is about 1013 mb.

52. If you are inside a car during a thunderstorm, you are considered relatively safe from lightning. Why?
(A) The metal body of the car conducts the charge around the occupants.
(B) The durable rubber tires insulate the car from the ground.
(C) The car's engine generates a field that actively repels lightning.
(D) Lightning is physically unable to strike any moving object.

Ans :

29. Over which type of surface do cyclones form?
(A) Cold, dry deserts
(B) High mountain ranges
(C) Warm ocean waters
(D) Large, frozen lakes

Ans :

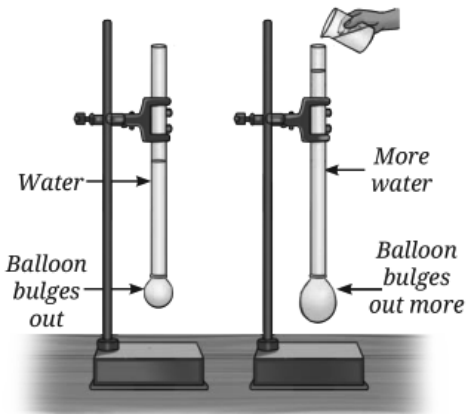
(C) Warm ocean waters
Cyclones are massive storms that derive their energy from the heat and moisture of warm ocean water. The process begins when warm, moist air over the ocean rises, creating a low-pressure system that can intensify into a cyclone.

30. A nail's pointed end is to high pressure as a broad water tank base is to _____.
(A) Low pressure
(B) High liquid flow
(C) Storing more water
(D) Withstanding high pressure

Ans :

(D) Withstanding high pressure
The pointed end of a nail is designed to create high pressure. The broad base of a dam or water tank is designed to withstand the high pressure exerted by the deep water at the bottom by distributing the force over a large area.

31. In Figure as more water is added to the pipe, the balloon at the bottom bulges out more. This demonstrates that _____.



Higher heights of water column produce bigger bulge of the balloon

(A) Liquid pressure increases with the height of the column
(B) The balloon's rubber is stretching
(C) The weight of the water is increasing
(D) The pipe is getting wider

Ans :

(A) Liquid pressure increases with the height of the column
The extent of the bulge in the balloon is a direct indicator of the pressure being exerted on it. As the height of the water column increases, the bulge becomes larger, visually demonstrating the direct relationship between liquid depth and pressure.

32. Which of the following is NOT a safe practice during a thunderstorm with lightning?
(A) Staying inside a car or a bus.
(B) Taking shelter under a tall, isolated tree.
(C) Crouching down in a low-lying open area.
(D) Staying away from windows and metallic objects.

Ans :

(B) Taking shelter under a tall, isolated tree.
Lightning tends to strike the tallest object in an area. Taking shelter under an isolated tall tree is extremely dangerous as the tree is a likely target for a strike, and the electrical charge can easily transfer to a person underneath it.

33. The calm, low-pressure region at the center of a cyclone is known as the _____.
(A) Wall
(B) Core
(C) Eye
(D) Heart

Ans :

(C) Eye
The eye is the distinct, often cloud-free, and calm central region of a strong tropical cyclone. While the winds are light in the eye, it is surrounded by the eye wall, which has the storm's most violent winds.

34. Air moves from a region of _____ pressure to a region of _____ pressure.
(A) Low, high
(B) Equal, unequal
(C) Low, equal
(D) High, low

Ans :

(D) High, low
This is the fundamental principle that drives wind. The atmosphere naturally seeks equilibrium, so air flows from areas where it is more compressed (high pressure) to areas where it is less compressed (low pressure).

Click Here to Buy book on Amazon

59. How does the pressure at the bottom of a wide lake compare to the pressure at the same depth in a narrow well?
(A) The pressure is greater in the lake.
(B) The pressure is the same in both.
(C) The pressure is greater in the well.
(D) It depends on the total volume of water.

Ans :

(B) The pressure is the same in both.
Liquid pressure depends only on the depth (height of the liquid column) and the density of the liquid, not on the shape or width of the container. At the same depth, the pressure in the wide lake and the narrow well will be identical.

60. A hiker climbing a tall mountain might experience a nosebleed. This can be caused by the _____.
(A) The difference between internal body and external air pressure.
(B) The significant increase in air pressure at very high altitudes.
(C) The general lack of breathable oxygen in the air at that height.
(D) The presence of consistently strong winds on the mountain.

Ans :

(A) The difference between internal body and external air pressure.
Air pressure decreases significantly at high altitudes. The pressure inside the blood vessels of the hiker's body, which is adapted to lower altitudes, can become much higher than the external pressure, causing delicate vessels in the nose to rupture.

61. Which of the following statements about lightning is incorrect?
(A) It can occur between clouds, within a cloud, or between a cloud and the ground.
(B) It is a bright flash of light caused by a sudden flow of electric charges.
(C) It rapidly cools the air around it.
(D) It is a key component of a thunderstorm.

Ans :

(C) It rapidly cools the air around it.
Lightning is an extremely high-energy event that rapidly heats the air in its path to temperatures hotter than the surface of the sun. This rapid heating, not cooling, is what causes the air to expand and create the sound of thunder.

62. The phenomena of land and sea breezes are driven by _____.
(A) The Moon's gravitational pull on the air
(B) The Earth's magnetic field changing direction
(C) Moisture differences between land and sea
(D) Uneven heating of land and sea, leading to pressure differences

Ans :

(D) Uneven heating of land and sea, leading to pressure differences
Land and water heat and cool at different rates. This differential heating creates temperature gradients, which in turn create pressure differences in the air above them, driving the predictable daily cycle of sea breezes and land breezes.

63. What happens to a cyclone when it moves over land?
(A) It becomes stronger and faster.
(B) It gradually loses its strength and dissipates.
(C) It changes its direction of spin.
(D) It turns into a thunderstorm.

Ans :

(B) It gradually loses its strength and dissipates.
Cyclones are fueled by the continuous supply of heat and moisture from warm ocean waters. Once a cyclone makes landfall, it is cut off from this energy source, causing it to progressively weaken and eventually die out.

64. Positive is to top of cloud as _____ is to bottom of cloud during charge separation.
(A) Negative (B) Positive
(C) Neutral (D) Icy

Ans :

(A) Negative
This analogy describes the typical charge separation within a thundercloud. Lighter, positively charged ice crystals are carried to the upper parts of the cloud, while heavier, negatively charged water droplets and hail accumulate in the lower parts.

65. The primary reason a sharp knife cuts better than a blunt one is that the sharp edge _____.
(A) Applies significantly more force to the object being cut
(B) Has much less friction against the material's surface
(C) Concentrates force onto a small area, creating high pressure
(D) Is always made of a much harder and sharper material

Downloaded from www.pdf.tube

Ans :

(C) Concentrates force onto a small area, creating high pressure
A sharp edge has a minuscule surface area. When a person applies a force, this small area results in an extremely high pressure, which is sufficient to sever the bonds in the material being cut. A blunt edge distributes the same force over a larger area, resulting in low pressure.

66. What is the main function of a cyclone shelter?
(A) To store food and water for the community.
(B) To act as a weather monitoring station.
(C) To serve as a base for rescue helicopters.
(D) To provide a safe, structurally sound building for people to take refuge in during a cyclone.

Ans :

(D) To provide a safe, structurally sound building for people to take refuge in during a cyclone.
Cyclone shelters are specifically designed and constructed to withstand the high winds and potential flooding associated with a cyclone. Their primary purpose is to protect human lives by providing a secure place for people to evacuate to from more vulnerable structures.

67. A force of 200 N is applied over an area of 4 m^2. The pressure is _____.
(A) 50 Pa
(B) 800 Pa
(C) 204 Pa
(D) 196 Pa

Ans :

(A) 50 Pa
Pressure is calculated as Force divided by Area. So, Pressure = 200 N / 4 m^2 = 50 N/m^2. Since 1 N/m^2 equals 1 Pa, the pressure is 50 Pa.

68. Which statement accurately describes liquid pressure?
(A) It acts only in the downward direction.
(B) It acts in all directions and increases with depth.
(C) It is stronger in a wider container than a narrow one at the same depth.
(D) It is independent of the height of the liquid column.

Ans :

(B) It acts in all directions and increases with depth.
A liquid exerts pressure not only downwards on the base of its container but also sideways on the walls. This pressure is uniform at any given depth and its magnitude increases directly with an increase in that depth.

69. While on a picnic, Megha's bag with broad straps is comfortable, while Pawan's identical bag with narrow straps hurts his shoulders. This is a real-life example of how _____.
(A) Force depends on area
(B) Weight changes with the shape of the strap
(C) Pressure depends on the area over which a force acts
(D) Friction is reduced by broader surfaces

Ans :

(C) Pressure depends on the area over which a force acts
Both bags have the same weight (force). The narrow straps concentrate this force onto a small area of Pawan's shoulders, creating high, uncomfortable pressure. Megha's broad straps spread the same force over a larger area, resulting in lower, more comfortable pressure.

70. How does the air movement in a land breeze at night differ from a sea breeze during the day?
(A) A land breeze moves from land to sea; a sea breeze moves from sea to land.
(B) There is no difference.
(C) A land breeze is a high-speed wind, while a sea breeze is a gentle wind.
(D) A land breeze brings moisture, while a sea breeze brings dry air.

Ans :

(A) A land breeze moves from land to sea; a sea breeze moves from sea to land.
The direction of the breeze reverses between day and night. During the day, the sea breeze blows from the cooler sea to the warmer land. At night, the land cools faster, so the land breeze blows from the cooler land to the warmer sea.

71. In regions prone to cyclones, one of the most important actions for citizens to take is to _____.
(A) Ignore weather reports to avoid panic
(B) Go to the beach to watch the cyclone arrive
(C) Open all electrical appliances to prevent damage
(D) Stay updated on weather reports and warnings from the IMD

Ans :

NODIA

(D) Stay updated on weather reports and warnings from the IMD

The India Meteorological Department (IMD) provides crucial and timely information about the path, intensity, and expected landfall of cyclones. Heeding these official warnings is the most important step for ensuring safety and making necessary preparations like evacuation.

72. Which of the following is NOT a destructive effect of a cyclone?

(A) Strong winds pushing a wall of water (storm surge) onto coastal areas.
(B) The calm weather and clear skies in the eye of the storm.
(C) Heavy rainfall causing floods and landslides.
(D) Contamination of drinking water sources by seawater.

Ans :

(B) The calm weather and clear skies in the eye of the storm.

The calm weather in the eye is a characteristic feature of a cyclone, not a destructive effect. The destruction is caused by the powerful winds in the eyewall, the storm surge, and the torrential rain that accompanies the storm system.

73. Warm air rises → _____ → Water vapor condenses → Clouds form. What is the missing step in this process?

(A) The rising air expands and cools
(B) Air pressure increases
(C) The air gets heavier
(D) The sun stops shining

Ans :

(A) The rising air expands and cools

As a parcel of warm air rises, it moves into a region of lower atmospheric pressure. This allows the air parcel to expand. The process of expansion uses energy, which causes the air to cool down, leading to the condensation of its water vapor.

74. When an inflated balloon's mouth is left open, air rushes out. This happens because _____.

(A) The rubber of the balloon pushes the air out
(B) The air inside is colder than the air outside
(C) The air pressure inside the balloon is higher than the atmospheric pressure outside
(D) The balloon has a natural magnetic field

Ans :

(C) The air pressure inside the balloon is higher than the atmospheric pressure outside

Inflating a balloon compresses the air inside it, creating a region of high pressure. When the mouth is opened, the air naturally and rapidly flows from this high-pressure region inside to the lower-pressure region of the surrounding atmosphere.

75. In Figure, when a person blows between two hanging balloons, the balloons move closer. This demonstrates that _____.

Blowing between two balloons

(A) Blowing creates a magnetic field
(B) The balloons are electrically charged
(C) The force of gravity between the balloons increases
(D) High-speed winds are accompanied by reduced air pressure

Ans :

(D) High-speed winds are accompanied by reduced air pressure

The fast-moving stream of air between the balloons creates a zone of lower pressure. The relatively higher pressure of the still air on the outer sides of the balloons then pushes them inward towards each other.

76. A force of 1 N is applied to an area of 1 m^2. The resulting pressure is _____.

(A) 1 pascal
(B) 1 newton
(C) 1 meter
(D) 1 kilogram

Ans :

(A) 1 pascal

The pascal (Pa) is the SI unit of pressure. It is specifically defined as a force of one newton being applied over an area of one square meter (1 N/m^2).

Download INDIA's Best Study app NODIA

Click Here to Buy book on Amazon

This is a demonstration of Bernoulli's principle. The stream of fast-moving air between the balloons has a lower pressure than the still air on the outer sides. This pressure difference creates a net force that pushes the balloons inward.

41. A resident on the first floor of a building receives tap water with greater force than a resident on the third floor, even though both are supplied by the same rooftop tank. Why?
(A) The pipes that lead to the first floor apartment are much wider.
(B) The water that reaches the first floor is significantly colder.
(C) The height of the water column above the tap is greater.
(D) The resident living on the third floor probably uses more water.

Ans :

(C) The height of the water column above the tap is greater.
Water pressure is directly proportional to the vertical distance (height) from the water source (the tank) to the outlet (the tap). The tap on the first floor has a greater height of water above it than the tap on the third floor, hence the pressure is higher.

42. The process where rising warm air expands, cools, and its moisture forms water droplets is called _____.
(A) Evaporation
(B) Precipitation
(C) Circulation
(D) Condensation

Ans :

(D) Condensation
Condensation is the phase change of water from a gaseous state (water vapor) to a liquid state (water droplets). This process occurs in the atmosphere when warm, moist air rises and cools to its dew point, leading to the formation of clouds.

43. Thunderstorms known as 'mango showers' in Kerala and Karnataka are beneficial because they _____.
(A) Prevent the ripening of mangoes
(B) Support the ripening of mangoes
(C) Occur after the main monsoon season
(D) Bring cold weather to the region

Ans :

(B) Support the ripening of mangoes
These are pre-monsoon thunderstorms. The rainfall they bring is crucial for various crops in the region and is specifically named 'mango showers' because it helps in the ripening of the mango crop.

44. Lightning is to electric discharge as thunder is to _____.
(A) Sound wave
(B) Light flash
(C) High wind
(D) Heavy rain

Ans :

(A) Sound wave
This analogy relates a phenomenon to its physical nature. Lightning is a visible flash caused by an electrical discharge. Thunder is the audible effect that results from this discharge, specifically the sound wave created by the rapidly expanding air.

45. To prevent a weak roof from being blown off during a storm with high-speed winds, it is safer to _____.
(A) Seal all doors and windows tightly
(B) Keep doors and windows open
(C) Climb onto the roof to hold it down
(D) Cover the roof with a heavy plastic sheet

Ans :

(B) Keep doors and windows open
Opening doors and windows allows air to flow through the house. This helps to equalize the pressure inside the house with the low pressure created by the wind blowing over the roof, reducing the net upward lifting force.

46. What is the primary role of weather monitoring satellites in cyclone management?
(A) To change the direction of a cyclone.
(B) To weaken the strength of a cyclone.
(C) To create cyclones for scientific study.
(D) To track cyclones and predict their path for early warnings.

Ans :

(D) To track cyclones and predict their path for early warnings.
Satellites are crucial tools for modern meteorology. They continuously monitor weather patterns over vast ocean areas, allowing forecasters to detect the formation of cyclones, track their movement, and predict their intensity and landfall, which is vital for issuing timely warnings.

NODIA

83. Why are airplane wings shaped with a curve on the top and a flatter surface on the bottom (an airfoil)?

(A) To make the airplane much heavier so it is more stable in flight.
(B) To reduce the overall friction of the air against the wing's surface.
(C) To make the wings look much more elegant and aesthetically pleasing.
(D) Air travels faster over the top, creating lower pressure and lift.

Ans :

(D) Air travels faster over the top, creating lower pressure and lift.
The airfoil shape forces air to travel a longer distance over the top surface in the same amount of time as the air traveling under the bottom. This results in faster-moving air and lower pressure on top, creating a net upward force called lift.

MATCHING TYPE QUESTIONS

84. Match the fundamental concepts of pressure with their correct definitions.

	Column A		Column B
1	Pressure	A	Increases with the depth of the liquid, which is why dam bases are built broader.
2	Pascal (Pa)	B	The force exerted per unit area, calculated as Force divided by Area.
3	Liquid Pressure	C	The pressure exerted by the envelope of air surrounding the Earth.
4	Atmospheric Pressure	D	The SI unit of pressure, which is equivalent to one newton per square meter

Options

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-D, 2-C, 3-B, 4-A
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(c) 1-B, 2-D, 3-A, 4-C

Pressure is defined as force per unit area. The SI unit for pressure is the Pascal. Liquid pressure increases with depth, affecting structures like dams. Atmospheric pressure is the pressure exerted by the air around us.

85. Match the weather phenomenon with its correct description.

	Column A		Column B
1	Wind	A	A storm that is accompanied by both lightning and thunder.
2	Sea Breeze	B	A large, spinning storm system with a calm central eye that forms over warm ocean waters.
3	Thunderstorm	C	The movement of air from a region of high pressure to a region of low pressure.
4	Cyclone	D	A wind that blows from the sea to the land during the day due to differential heating.

Options

(a) 1-D, 2-B, 3-A, 4-C
(b) 1-A, 2-C, 3-D, 4-B
(c) 1-C, 2-D, 3-A, 4-B
(d) 1-B, 2-A, 3-C, 4-D

Ans :

(c) 1-C, 2-D, 3-A, 4-B
Wind is the movement of air from high to low-pressure areas. A sea breeze occurs during the day as land heats up faster than the sea. A thunderstorm is a storm that includes lightning and thunder. A cyclone is a large rotating storm formed over warm oceans.

Download INDIA's Best Study app NODIA

86. Match the atmospheric event with its underlying scientific cause.

	Column A		Column B
1	High-speed winds lifting roofs	A	The calm, low-pressure area at the center of a large, rotating storm.

Downloaded from www.pdf.tube

Ans :

The sound of thunder is caused by the rapid heating and expansion of air around a lightning strike, which produces a loud sound wave.

128. What two important requirements are needed for the formation of thunderstorms?

Ans :

The two most important requirements for the formation of thunderstorms are the presence of moisture and strong winds, which facilitate the development of clouds.

129. What is the fundamental principle that governs the movement of air?

Ans :

The fundamental principle is that air always moves from a region of high air pressure to a region of low air pressure in the atmosphere.

130. What is the main function of the India Meteorological Department (IMD)?

Ans :

The India Meteorological Department (IMD) constantly monitors weather phenomena such as cyclones and thunderstorms in India to issue warnings and alerts.

131. How do electric charges develop within clouds during a thunderstorm?

Ans :

Static electric charges develop within clouds due to the rubbing between water droplets and ice particles, facilitated by strong upward and downward winds.

132. What happens to a balloon's bulge as the height of a water column increases?

Ans :

As the height of the water column increases, the pressure at the bottom of the pipe also increases, causing the balloon to bulge out more.

133. Why does opening windows and doors help prevent roofs from being blown off?

Ans :

Opening windows allows wind to move through the house, reducing the pressure difference between the inside and outside, thus protecting the roof.

134. How does a land breeze form at night?

Ans :

At night, the sea is warmer than the land, creating a low-pressure area over it. Wind then blows from the high-pressure land to the sea.

135. How does Earth's rotation contribute to the formation of a cyclone?

Ans :

The rotation of the Earth causes the air rushing towards a low-pressure center to spin, which is a critical step in the formation of a cyclone.

136. What are the main gaseous components of the Earth's atmosphere?

Ans :

The Earth's atmosphere is primarily composed of nitrogen and oxygen, along with smaller quantities of argon, carbon dioxide, and other trace gases.

137. Where is the weather calmest during a cyclone?

Ans :

The weather is calm at the eye of the cyclone, which is the low-pressure center, while strong winds and heavy rain occur in the surrounding region.

NODIA

138. Why can seawater from a cyclone contaminate drinking water sources?

Ans :

During a cyclone, the storm surge can cause seawater to rush far inland, which can contaminate freshwater sources like wells and rivers with salt.

139. What is the practical unit of air pressure and its value in Pascals?

Ans :

The practical unit of air pressure is the millibar (mb). One millibar is equal to 100 Pascals (Pa), and it is commonly used in meteorology.

140. In which regions of India are storms more frequent?

Ans :

Storms are more frequent in hot, humid, and tropical regions. India, having such climatic conditions, experiences storms more often than many other areas.

TRUE AND FALSE

89. Pressure is defined as the total force applied to a surface, regardless of the area over which it acts.

Ans :

False
Pressure is defined as the force applied per unit area. The area is a critical component in determining pressure.

90. A school bag with broad straps feels more comfortable than one with narrow straps because the broader area reduces the pressure on the shoulders.

Ans :

True
Broad straps spread the bag's weight over a larger area of the shoulders, decreasing the pressure and making it more comfortable to carry.

91. The pressure exerted by a column of water in a pipe depends primarily on the total weight of the water, not its height.

Ans :

False
The pressure exerted by a liquid depends on the height of its column; equal heights of water produce the same pressure, regardless of the container's width or the water's total weight.

92. Liquids exert pressure only at the bottom of their container.

Ans :

False
Liquids exert pressure on the bottom and also on the sides of a container; in fact, they exert pressure in all directions.

93. As wind speed increases, the air pressure in that area also increases.

Ans :

False
High-speed winds are accompanied by reduced air pressure. This is why weak roofs may be blown away during a storm.

94. Wind is caused by air moving from a region of low pressure to a region of high pressure.

Ans :

False
Air moves from a region of high air pressure to a region of low air pressure, and this movement of air creates winds.

95. The eye of a cyclone is a calm, low-pressure area at its center.

Ans :

True
The region of lowest pressure at the center of a cyclone is known as the eye, where the wind is calm.

96. Lightning occurs when static electric charges, built up from the rubbing of ice and water particles, are suddenly discharged in a cloud.

Ans :

True
Strong updrafts and downdrafts in clouds cause ice and water particles to rub together, creating a separation of electric charges that leads to lightning.

97. The sound of thunder is produced when lightning rapidly cools the surrounding air, causing it to contract.

Ans :

False
Lightning rapidly heats the air around it, causing a sudden expansion that produces the loud sound we know as thunder.

98. A lightning conductor protects buildings by absorbing the electrical charge from lightning and storing it.

Ans :

False
A lightning conductor provides an easy path for the electric charge from a lightning strike to be transferred safely into the ground.

99. Cyclones form over land and gain their strength by moving toward warm ocean waters.

Ans :

False
Cyclones are large storms that form over warm ocean waters. They gradually lose strength when they move over land and are cut off from their moisture source.

Download INDIA's Best Study app NODIA

Click Here to Buy book on Amazon

150. A student performs an experiment with two pipes of different diameters but fills them with water to the same height, as shown in the table. Which balloon will bulge more, and what conclusion can be drawn about liquid pressure from this observation?

Setup	Pipe Diameter	Water Column Height	Attached Balloon
A	Narrow	15 cm	Balloon A
B	Broad	15 cm	Balloon B

Ans :

Both balloons will bulge to the same extent. This shows that the pressure exerted by a liquid at a certain point depends on the height of the liquid column above it, not on the width of the container or the total weight of the liquid.

151. Describe the structure of a fully developed cyclone.

Ans :

A cyclone is a large, spinning system of clouds and high-speed winds. At its center is the "eye," a calm area with the lowest pressure. Surrounding the eye is the eye wall, where the winds are strongest and rainfall is heaviest. This entire system revolves around the low-pressure eye, moving from the ocean towards land, generating immense power and causing widespread destruction along its path.

152. How is a thunderstorm formed?

Ans :

The formation of a thunderstorm begins when warm, moist air over heated land rises, creating a low-pressure area. Cooler air rushes in, also gets heated, and rises, establishing a continuous wind circulation. As the rising air cools, moisture condenses into clouds. The rapid upward and downward movement of air and water droplets leads to charge separation, lightning, and thunder.

153. Why is the base of a dam made much broader than its top?

Ans :

The base of a dam is made broader to withstand the immense horizontal pressure exerted by the stored water. Liquid pressure increases with depth, so the pressure near the bottom of the dam is significantly greater than at the top. A broad base provides the necessary structural support to counteract this powerful force and prevent the dam from collapsing.

154. The table lists local thunderstorms in different regions of India. What common benefits do "Kalboishakhi" and "mango showers" bring to their respective regions before the main monsoon season arrives?

Name of Storm	Region(s)
Kalboishakhi	West Bengal, Bihar, Jharkhand
Mango Showers	Kerala, Karnataka, Tamil Nadu
Bordoisila	Assam

Ans :

Both Kalboishakhi and mango showers are pre-monsoon thunderstorms that bring beneficial rain. Kalboishakhi helps in the growth of kharif crops in West Bengal, Bihar, and Jharkhand. Mango showers support the ripening of mangoes in Kerala, Karnataka, and Tamil Nadu.

155. Explain why we are not crushed under the immense weight of the atmosphere.

Ans :

The reason we are not crushed is due to a balance of pressures. The pressure inside our bodies, caused by fluids and gases in our tissues, is equal to the atmospheric pressure outside. This internal pressure pushes outwards with the same force that the atmosphere pushes inwards, resulting in a net force of zero and preventing us from being crushed.

NODIA

156. Describe the destructive impacts a cyclone can have after making landfall.

Ans :

The destructive impacts are numerous and include:

- **Storm Surge** : Strong winds push ocean water ashore, creating a massive wall of water that can cause severe flooding in coastal areas.
- **Heavy Rainfall** : The intense rain leads to overflowing rivers and can trigger devastating landslides in hilly regions.
- **Contamination** : Seawater rushing inland contaminates drinking water sources and damages farmland by increasing soil salinity.

113. What is a storm, as defined in the chapter?

Ans :

A storm is a weather phenomenon characterized by strong winds that are accompanied by precipitation in the form of rain, hail, or snow.

114. How is a thunderstorm different from a regular storm?

Ans :

A thunderstorm is a type of storm that is specifically accompanied by the presence of both lightning and the sound of thunder in addition to winds.

115. What is the calm, low-pressure area at the center of a cyclone called?

Ans :

The region of the lowest pressure, which is located at the center of a cyclone, is known as the eye of the cyclone.

116. Explain why we are not crushed by the large atmospheric pressure.

Ans :

We are not crushed by atmospheric pressure because the pressure inside our bodies is equal to the external pressure, which effectively balances it out.

117. How does a rubber sucker stick firmly to a smooth, flat surface?

Ans :

When pressed, air is pushed out, creating lower pressure inside. The higher atmospheric pressure outside then holds the sucker firmly against the surface.

118. What causes the formation of a sea breeze during the day?

Ans :

During the day, land heats faster than the sea, creating low pressure. Air from the high-pressure region over the sea blows towards the land.

119. Why can high-speed winds sometimes blow off the roofs of houses?

Ans :

High-speed winds create a low-pressure area above the roof. The higher pressure inside the house can then push the roof upwards and blow it off.

120. What is the definition of a lightning conductor?

Ans :

A lightning conductor is a metallic rod that is installed on buildings to provide a safe path for electric charges from lightning to the ground.

121. Why does a cyclone begin to lose its strength after it reaches land?

Ans :

A cyclone weakens over land because its source of warm, moist air from the ocean is cut off, which is essential for its survival.

122. How does blowing air between two suspended balloons cause them to move?

Ans :

Blowing air between the balloons creates a low-pressure area. The higher air pressure on the outer sides of the balloons pushes them toward each other.

123. Why do people often place a round piece of cloth on their head?

Ans :

People place a cloth on their heads to increase the area over which a load's weight acts, thereby reducing the pressure and making it comfortable.

124. What is lightning?

Ans :

Lightning is a bright flash of light produced by a sudden flow of electric charges when the insulating property of air breaks down due to buildup.

NODIA

125. What is the relationship between high-speed winds and air pressure?

Ans :

High-speed winds are accompanied by reduced air pressure. As the speed of the wind increases, the pressure in that region decreases significantly.

126. In which directions do liquids exert pressure inside a container?

Ans :

Liquids exert pressure in all directions. They exert pressure not only at the bottom of a container but also on all of its side walls.

127. What causes the sound of thunder during a storm?

2	Lightning	B	Caused by reduced air pressure above the roof compared to the higher pressure inside the house.
3	Thunder	C	The loud sound produced when air is rapidly heated and expands due to a lightning strike.
4	Eye of a cyclone	D	A sudden discharge of static electricity built up in clouds from the rubbing of ice and water particles.

Options
(a) 1-B, 2-D, 3-C, 4-A
(b) 1-C, 2-A, 3-D, 4-B
(c) 1-D, 2-B, 3-A, 4-C
(d) 1-A, 2-C, 3-B, 4-D

Ans :

(a) 1-B, 2-D, 3-C, 4-A
High-speed winds create low pressure, which can lift roofs. Lightning is an electrical discharge from charge separation in clouds. Thunder is the sound created by the rapid heating of air from lightning. The eye is the calm, low-pressure center of a cyclone.

87. Match the practical application or safety measure with the scientific principle it demonstrates.

	Column A		**Column B**
1	School bags with broad straps	A	Is made broad to withstand the high pressure of water at greater depths.
2	A sharp knife edge	B	Increases the pressure for a given force, making it easier to cut things.
3	A wide dam base	C	A metallic rod that protects buildings by providing an easy path for electric charges to the ground.
4	A lightning conductor	D	Increases the area over which the bag's weight acts, thereby reducing the pressure on the shoulders.

Options
(a) 1-A, 2-C, 3-D, 4-B
(b) 1-D, 2-B, 3-A, 4-C
(c) 1-B, 2-A, 3-C, 4-D
(d) 1-C, 2-D, 3-B, 4-A

Ans :

(b) 1-D, 2-B, 3-A, 4-C
Broad straps reduce pressure by increasing the area. A sharp knife increases pressure by reducing the area. A dam's wide base is built to withstand higher pressure at greater depths. A lightning conductor provides a safe path for electrical discharge.

Download INDIA's Best Study app NODIA

88. Match the term with its correct definition or description from the chapter.

	Column A		**Column B**
1	Low-pressure area	A	The SI unit for pressure.
2	Pascal	B	A region created when warm, moist air rises, into which cooler, high-pressure air rushes.
3	Wind Circulation	C	A metallic rod installed on buildings to protect them from lightning strikes.
4	Lightning Conductor	D	The continuous process of warm air rising and cool air rushing in to take its place.

Options
(a) 1-D, 2-C, 3-B, 4-A
(b) 1-C, 2-D, 3-A, 4-B
(c) 1-A, 2-B, 3-C, 4-D
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(d) 1-B, 2-A, 3-D, 4-C
A low-pressure area is created when warm air rises. Pascal is the SI unit of pressure. Wind circulation is the continuous movement of air due to heating and cooling. A lightning conductor is a safety device for buildings.

Downloaded from www.pdf.tube

141. How does charge separation occur within a thunderstorm cloud?

Ans :

Positively charged lighter ice particles move to the upper part of the cloud, while negatively charged heavier water droplets occupy the lower part.

142. Why is it advised to crouch down in a low-lying area during lightning?

Ans :

Crouching low minimizes your height and contact with the ground, making you a smaller target and reducing the risk of a direct lightning strike.

143. How can a cyclone cause landslides?

Ans :

The heavy and persistent rainfall that accompanies a cyclone can saturate the soil on hills and slopes, leading to instability and triggering dangerous landslides.

SHORT ANSWER QUESTIONS

144. Describe the process of lightning formation within a thunderstorm cloud.

Ans :

Inside a thunderstorm cloud, strong winds cause ice particles and water droplets to rub against each other, creating static charges. Positive charges accumulate at the top of the cloud and negative charges at the bottom. When the charge buildup becomes very large, a sudden discharge occurs, producing a bright flash of light that we see as lightning.

145. Explain why liquids exert pressure in all directions within a container.

Ans :

Liquids exert pressure in all directions because their particles are in constant, random motion. This movement causes them to collide with the bottom and the sides of the container. These continuous collisions exert a force over the container's surfaces, which we observe as pressure acting not just downwards but sideways as well, as demonstrated by water flowing from side holes.

146. Why is a school bag with broad straps easier to carry?

Ans :

The key reasons are:

- **Increased Area** : Broad straps increase the surface area over which the bag's weight is distributed on the shoulders.
- **Reduced Pressure** : According to the formula Pressure = Force/Area, increasing the area significantly reduces the pressure exerted on the shoulders.
- **Comfort** : This lower pressure makes the bag feel more comfortable and less painful to carry, even if the weight is identical.

147. What happens to air pressure when high-speed winds blow over a roof?

Ans :

When high-speed winds blow over a roof, a region of low air pressure is created above it. This phenomenon occurs because, as the velocity of a fluid like air increases, its pressure decreases. The normal, higher air pressure inside the house then exerts an upward force on the roof, which can be strong enough to lift it if it is weak.

148. Explain the scientific principle behind the formation of a sea breeze.

Ans :

During the day, land heats up faster than the sea. This causes the air above the land to become warm, expand, and rise, creating a low-pressure area. The air over the cooler sea remains at a higher pressure. Consequently, the cooler, denser air from the high-pressure region over the sea blows toward the low-pressure region on land, creating a sea breeze.

NODIA

149. How does a lightning conductor work to protect buildings?

Ans :

The main functions of a lightning conductor are:

- **Installation** : It is a metallic rod installed along the walls of a building, with one pointed end extending above the highest point.
- **Path for Charge** : The other end is buried deep in the ground, providing an easy and direct path for electrical charges.
- **Protection** : It safely channels the massive electric charge from a lightning strike into the ground, preventing damage to the building.

100. The SI unit for pressure is the newton per square meter (N/m^2), which is also called a pascal (Pa).

Ans :

True Pressure is force divided by area, so its SI unit is newton per square meter (N/m^2). This unit is also named pascal (Pa).

101. We are not crushed by atmospheric pressure because the pressure inside our bodies is much lower than the pressure outside.

Ans :

False
We are not crushed because the pressure inside our bodies is equal to the atmospheric pressure outside, creating a balance.

102. The spinning motion of a cyclone is caused by the rotation of the Earth.

Ans :

True
As air rushes toward the low-pressure center of a developing storm, the Earth's rotation causes the moving air to spin, forming a cyclone.

103. During a thunderstorm, the safest place to be outdoors is under the tallest tree available.

Ans :

False During lightning, you should stay away from tall objects like trees. It is safer to find a low-lying area and crouch down or remain in a car.

VERY SHORT QUESTIONS

104. What is the scientific definition of pressure?

Ans :

Pressure is defined as the force acting per unit area. It is a quantity that involves the force and the area over which it acts.

105. What is the SI unit of pressure, and what is it also called?

Ans :

The SI unit of pressure is newton per square metre (N/m^2). This unit is also called a pascal, which is denoted by Pa.

106. What is the layer of air that surrounds the Earth called?

Ans :

The envelope of air that surrounds the Earth is known as the atmosphere. This layer of air extends for many kilometers above the Earth's surface.

107. What is atmospheric pressure?

Ans :

Atmospheric pressure is the pressure exerted by the air that is all around us. In fact, air exerts this pressure on all objects within it.

108. Explain why a bag with broader straps feels more comfortable.

Ans :

A bag with broader straps is more comfortable because the weight is spread over a larger area, which significantly reduces the pressure on the shoulders.

109. Why is it easier to drive a nail using its pointed end?

Ans :

It is easier to drive a nail using its pointed end because the applied force acts on a smaller area, resulting in a much higher pressure.

110. Why are overhead water tanks typically placed at a height?

Ans :

Overhead water tanks are placed at a height to increase the pressure in the taps, which ensures a good and powerful stream of water flows out.

111. Why is the base of a large dam constructed to be very broad?

Ans :

The base of a dam is made broader than the top to withstand the immense horizontal water pressure that acts near the bottom of the dam.

112. What causes the formation of winds in the atmosphere?

Ans :

Winds are caused by differences in air pressure between different regions. Air naturally moves from an area of high pressure to an area of low pressure.

Click Here to Buy book on Amazon

- **Infrastructure Damage** : Fallen trees and debris block roads, and power outages can disrupt daily life for days.

157. Compare the atmospheric conditions that lead to a land breeze and a sea breeze.

Ans :

The primary difference is the time of day and the resulting temperature difference between land and sea. A sea breeze occurs during the day when the land is warmer, creating low pressure that draws in cooler, high-pressure air from the sea. A land breeze occurs at night when the land cools faster, creating high pressure that causes wind to blow toward the warmer, low-pressure sea.

158. How does an experiment with two balloons and a straw demonstrate air movement?

Ans :

The experiment is set up with one inflated balloon and one uninflected balloon connected by a straw. The air pressure inside the inflated balloon is higher than in the uninflected one. As a result, air flows from the high-pressure inflated balloon to the low-pressure uninflected one until the pressures equalize, demonstrating that air always moves from high to low pressure.

159. How do liquids exert pressure, and how does this pressure vary with depth?

Ans :

Liquids exert pressure because the weight of the liquid column pushes down on the area below it. This pressure acts not only at the bottom but also on the sides of the container. The pressure increases with depth because the height, and therefore the weight, of the liquid column above that point increases, resulting in a greater force per unit area.

160. Why are small, localized thunderstorms in India known by different names?

Ans :

The reasons for different names are:

- **Regional Significance** : These storms, known as Kalboishakhi in West Bengal and Bordoisila in Assam, occur before the main monsoon.
- **Agricultural Impact** : They are called mango showers in Kerala and Karnataka because they help ripen mangoes.
- **Crop Support** : In Karnataka, they are also beneficial for the growth of coffee plants, highlighting their local agricultural importance.

161. Define pressure and list two everyday examples where high pressure is useful.

Ans :

Pressure is defined as the force exerted per unit area. High pressure is useful in various applications. For example, the pointed end of a nail concentrates force to create high pressure, allowing it to easily penetrate wood. Similarly, the sharp edge of a knife applies force over a very small area, generating high pressure that makes cutting through food effortless.

162. How does a rubber sucker demonstrate the power of atmospheric pressure?

NODIA

Ans :

When a rubber sucker is pressed against a smooth surface, most of the air between its cup and the surface is forced out. This creates a region of reduced air pressure inside the sucker. The significantly higher atmospheric pressure outside then pushes down on the sucker, holding it firmly in place and making it difficult to pull off without overcoming this pressure difference.

163. What is the relationship between the speed of wind and the pressure it exerts?

Ans :

There is an inverse relationship between wind speed and air pressure; high-speed winds are accompanied by reduced air pressure. This principle can be observed when blowing air between two suspended balloons. The fast-moving air creates a low-pressure zone between them, and the higher pressure on the outside pushes the balloons together, demonstrating this effect in a simple experiment.

164. The table outlines the steps in the formation of a thunderstorm and cyclone. Based on this sequence, what is the crucial difference between the formation of a simple storm and a cyclone?

Step	Process
1	Warm, moist air over a heat source rises, creating a low-pressure area.
2	Cooler air from high-pressure surroundings rushes in.

3	Rising air cools, and water vapor condenses to form clouds and rain.
4	The system of strong winds and rain is called a storm.
5	The Earth's rotation causes the moving air to spin, forming a cyclone.

Ans :

A simple storm is a system of strong winds and rain formed by rising warm, moist air. A cyclone is an advanced stage where this storm system begins to spin due to the Earth's rotation, creating a very low-pressure center with high-speed revolving winds.

165. What are the safety precautions one should take during a cyclone?

Ans :

The primary safety measures include:

- **Stay Informed** : It is crucial to stay updated on weather reports and heed warnings issued by meteorological departments like the IMD.
- **Emergency Kit** : People in cyclone-prone areas should prepare an emergency kit with essential items for safety and survival.
- **Evacuation** : During a cyclone, one should move quickly to a designated cyclone shelter for protection from the storm's impact.

166. Describe the process of charge separation that occurs inside a thunderstorm cloud.

Ans :

Inside a storm cloud, strong upward and downward winds cause collisions between water droplets and ice particles, generating static electricity. Through this process, the positively charged, lighter ice particles are carried to the upper part of the cloud. The negatively charged, heavier water droplets accumulate in the lower part of the cloud, resulting in a distinct separation of charges.

167. An experiment is conducted by blowing air between two balloons, and the results are recorded in the table. Explain the observation based on the relationship between wind speed and air pressure.

Action	**Observation**
Normal blowing between balloons	Balloons move towards each other.
Blowing harder between balloons	Balloons move towards each other faster.

Ans :

Blowing air between the balloons creates a region of low pressure. The higher pressure of the surrounding air pushes the balloons towards each other. Blowing harder increases the wind speed, further reducing the pressure and making them move together faster, showing high-speed winds cause lower pressure.

168. How does an experiment using a plastic bottle demonstrate that liquids exert sideways pressure?

Ans :

By making four small holes at the same height near the bottom of a plastic bottle and filling it with water, we can observe the effect. When the tape sealing the holes is removed, water flows out from all the holes simultaneously. This observation clearly indicates that the water exerts pressure not just downwards but also on the sides of the container.

169. Why does the air escape from an inflated balloon when its mouth is open?

Ans :

When a balloon is inflated, the air inside is compressed, creating a region of high pressure. The air outside the balloon is at a lower atmospheric pressure. Due to this pressure difference, the air naturally moves from the high-pressure region inside the balloon to the low-pressure region outside as soon as the mouth is opened, causing the balloon to deflate.

170. What are the main components of the Earth's atmosphere?

Ans :

The atmosphere is comprised of several gases. The main components are:

- **Nitrogen** : This is the most abundant gas, making up a significant portion of the air.
- **Oxygen** : Essential for respiration, oxygen is the second most abundant gas in the atmosphere.
- **Other Gases** : The atmosphere also contains smaller quantities of argon, carbon dioxide, and other trace gases.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

171. Describe how lightning can occur between different locations during a thunderstorm.

Ans :

Lightning is a massive electrical discharge. This can occur in several ways:

- **Within a Cloud** : Opposite charges can collide within the same cloud, creating a flash.
- **Between Clouds** : A discharge can happen between two separate clouds that have opposite charges.
- **Cloud to Ground** : It can also occur between the negatively charged lower part of a cloud and the positively charged ground below.

172. What causes a land breeze to occur at night?

Ans :

A land breeze forms due to differential cooling. At night, the land cools down faster than the adjacent sea, which retains its heat longer. This makes the air above the land cooler and denser, creating a high-pressure zone. Consequently, the wind blows from the high-pressure area on the land towards the warmer, low-pressure area over the sea.

173. What causes the formation and circulation of wind during a storm?

Ans :

The process involves a continuous cycle. When land gets heated, the warm and moist air above it rises, creating a low-pressure area. Cooler, denser air from surrounding high-pressure areas then rushes in to take its place. This newly arrived air, in turn, gets heated and also rises. This continuous process of rising warm air and incoming cool air results in wind circulation.

174. Why does keeping windows and doors open during a storm help protect the roof?

Ans :

The key reason is pressure equalization. When high-speed winds blow over a house, they create a low-pressure area above the roof. If windows are closed, the higher pressure inside can lift the roof. By keeping windows open, the wind can move through the house, which helps to reduce this pressure difference, thus preventing the roof from being blown off.

175. Explain the role of condensation in the intensification of a cyclone.

Ans :

As warm, moist air over the ocean rises, the water vapor in it condenses to form raindrops. This process of condensation releases a significant amount of heat back into the atmosphere. This released heat further warms the ascending air, causing it to rise even faster and creating an even lower pressure area, which intensifies the cyclone's strength and wind speeds.

NODIA

176. What is the function of a lightning conductor?

Ans :

The primary functions are:

- **Installation** : It is a metallic rod installed on buildings, extending from above the roof down into the ground.
- **Safe Path** : It provides a safe and easy path for the transfer of electrical charge from a lightning strike directly to the ground.
- **Damage Prevention** : By channeling the current, it protects the building from the destructive effects of lightning, such as fire or structural damage.

Download INDIA's Best Study app NODIA

177. How can we demonstrate that liquid pressure increases with the height of the water column?

Ans :

This can be demonstrated using a transparent pipe with a rubber balloon attached to its bottom end. As water is poured into the pipe, the balloon bulges. If more water is added, increasing the height of the water column, the balloon bulges out even more. This shows a direct relationship between the height of the liquid and the pressure it exerts.

178. The table shows a comparison between the conditions at the "eye" of a cyclone and the surrounding "eyewall". Why is it dangerous for people to assume the storm has passed when the eye is overhead?

Part of Cyclone	Wind Speed	Weather
Eye	Calm (Light winds)	Clear, little to no rain
Eyewall	Strongest winds (150–250 km/hr)	Heavy rainfall

Ans :

- **Observation** : Upon removing the tape, water is observed flowing out through all the holes on the sides of the bottle.
- **Conclusion** : This observation clearly indicates that the water inside exerts pressure not just downwards due to its weight, but also horizontally on the sides of the container. This confirms that liquids exert pressure on the walls of the vessel they are in.

187. Imagine you are a teacher. Explain to your students why it is safer to remain inside a car during a thunderstorm.

Ans :

Staying inside a car during a thunderstorm provides significant protection due to the following principles:

- **Metal Body** : A car's metal body acts like a protective cage. If lightning strikes the car, the electric charge will travel over the outer metal surface.
- **Path of Least Resistance** : The electricity follows the path of least resistance through the metal frame and down to the ground, typically through the tires.
- **Insulation** : The inside of the car is relatively insulated from this electrical charge, keeping the occupants safe from the direct impact of the lightning strike.
- **Safety Precaution** : It is important to avoid touching any metal parts inside the car, such as the door handles or radio, to ensure complete safety until the storm passes.

188. Create a detailed safety and preparedness plan for a coastal community based on the information provided about cyclones.

Ans :

A comprehensive safety plan for a cyclone-prone coastal community should include these critical elements:

- **Monitoring and Early Warning** : The community must stay constantly updated with weather reports and alerts issued by the India Meteorological Department (IMD), which uses satellite technology to track cyclones.
- **Emergency Kits** : Each household should prepare and maintain an emergency kit containing essential items like non-perishable food, water, first-aid supplies, torches, and batteries.
- **Evacuation Plan** : The community must be aware of the locations of designated cyclone shelters and have a clear evacuation plan to move to these safe locations quickly and efficiently when a warning is issued.
- **International Cooperation** : It is beneficial to be aware that national and international organizations work together to monitor cyclone-related disasters, providing additional layers of support and information for preparedness.
- **Post-Cyclone Awareness** : Residents should be educated about post-cyclone risks, such as contaminated water, blocked roads, and the danger of downed power lines to ensure safety during the recovery phase.

CASE BASED QUESTIONS

189. Megha and Pawan carry equally heavy school bags. Pawan's bag has narrow straps and hurts his shoulders, while Megha's bag with broad straps is comfortable. This is because the same force (weight of the bag) is spread over a larger area on Megha's shoulders, resulting in less pressure. This illustrates the relationship between force, pressure, and area.

Questions:

1. How is pressure defined in relation to force and area?
2. Explain why Megha's bag with broad straps exerts less pressure on her shoulders.
3. If a porter places a round piece of cloth on his head before carrying a heavy load, what scientific principle is he applying?

Ans :

1. Pressure is defined as the force per unit area.
2. The weight of the bag with broad straps is spread out over a larger area of her shoulders, which reduces the pressure.
3. He is applying the principle that increasing the area over which a force acts reduces the resulting pressure. The cloth increases the contact area on his head.

190. A student observes that the water tank supplying her multi-storeyed building is placed on the top floor. She learns that the pressure exerted by a liquid in a vessel depends only on the height of its column. Placing the tank at a greater height

Click Here to Buy book on Amazon

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

- **Low Pressure Example** : School bags have broad straps to distribute the weight (force) over a larger area of the shoulders. This reduces the pressure, making the bag more comfortable to carry.
- **Unit** : The SI unit for pressure is the newton per square meter (N/m^2), also known as the pascal (Pa).

183. Compare and contrast the phenomena of sea breeze and land breeze, explaining their causes.

Ans :

Sea and land breezes are both caused by differential heating of land and water, but they occur at different times of the day:

- **Sea Breeze (Daytime)** : During the day, the land heats up faster than the sea. The air above the land becomes warmer and rises, creating a low-pressure zone. Cooler, denser air from the high-pressure zone over the sea then blows towards the land to fill this void.
- **Land Breeze (Night-time)** : At night, the process reverses. The land cools down more quickly than the sea, which retains its heat. The air above the land becomes cooler and denser, creating a high-pressure zone. This causes the wind to blow from the land towards the warmer, low-pressure zone over the sea.
- **Core Principle** : In both cases, the movement of air is driven by the principle that wind flows from a region of higher pressure to a region of lower pressure.

184. Using the example of two suspended balloons, explain the principle that high-speed winds are accompanied by reduced air pressure.

Ans :

The principle can be demonstrated through a simple yet effective experiment:

- **The Setup** : Two balloons are inflated and hung from a stick with a small gap between them.
- **The Action** : When you blow air into the narrow space between the balloons, you are creating a region of high-speed wind.
- **The Observation** : As a result, the two balloons move towards each other instead of being pushed apart.
- **The Explanation** : This happens because the fast-moving air between the balloons creates a low-pressure area. The higher, normal air pressure on the outer sides of the balloons then pushes them inwards toward this low-pressure zone. This directly illustrates that high-speed winds are accompanied by reduced air pressure.

185. Analyze the various ways a cyclone can be destructive, providing at least four distinct examples.

Ans :

A cyclone's destructive power manifests in several ways, severely impacting life and property:

- **High-Speed Winds** : Cyclones are characterized by extremely strong winds, such as the Amphan cyclone with peak speeds of 270 km/h, which can uproot trees, damage buildings, and create widespread debris.
- **Storm Surge and Flooding** : The powerful winds push a massive wall of ocean water, as high as 3-12 meters, towards the shore. This storm surge can flood vast coastal areas and regions far from the sea.
- **Heavy Rainfall and Landslides** : The cyclone brings torrential rainfall, which can cause rivers to overflow their banks and saturate the ground, triggering dangerous landslides in vulnerable areas.
- **Contamination of Resources** : The influx of seawater can contaminate freshwater sources, making drinking water unsafe. It also damages farmland by increasing the salinity of the soil, making it less fertile for crops.
- **Disruption of Services** : Fallen trees and debris can block roads, hampering rescue efforts, while widespread power outages can last for days, disrupting essential services and daily life.

186. Explain how an experiment with a simple plastic bottle demonstrates that liquids exert pressure on the walls of their container.

Ans :

This principle can be effectively demonstrated through a straightforward experiment:

- **Preparation** : A used plastic bottle is taken, and four small holes are made near the bottom, all at the same height from the base. These holes are then temporarily sealed with tape.
- **Execution** : The bottle is filled with water, and then the tape is removed from all the holes simultaneously.

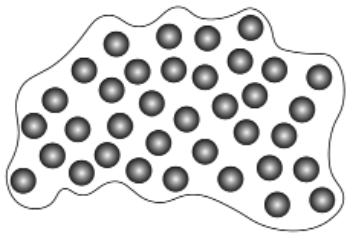
Downloaded from www.pdf.tube

4. Melting : When a solid is heated, its particles vibrate more vigorously. At a specific temperature, called the melting point, the particles break free from their fixed positions, and the solid turns into a liquid.

Download INDIA's Best Study app NODIA

2.2 The Liquid State

1. Properties : Liquids have a definite volume but no fixed shape; they take the shape of the container they are in.
2. Particle Arrangement : The interparticle attractions are weaker than in solids, but still strong enough to keep the particles close together. The particles are less tightly packed than in solids.
3. Particle Movement : Particles in a liquid are free to move and slide past one another within a limited space.



(c) Liquid

4. Boiling : When a liquid is heated to its boiling point, the particles gain enough energy to overcome the attractive forces and escape into the gaseous state.
5. Evaporation : The process of a liquid turning into vapor can also happen slowly from the surface at any temperature below the boiling point.

2.3 The Gaseous State

1. Properties : Gases have neither a fixed shape nor a fixed volume. They expand to fill the entire container they are in.
2. Particle Arrangement : The particles in a gas are very far apart, and the interparticle attractions are negligible(almost zero).
3. Particle Movement : Gas particles move freely, rapidly, and randomly in all available space.
4. Fluids : Because both liquids and gases can flow, they are classified as fluids.

3. COMPARING THE STATES OF MATTER

3.1 Interparticle Spacing and Compressibility

Gases have large interparticle spaces, which is why they are highly compressible. Applying pressure forces the particles closer together.
Liquids and solids have very small interparticle spaces and are considered incompressible.

3.2 Movement of Particles

The constituent particles of matter are in constant, random motion. This motion can be observed when a colored substance like potassium permanganate spreads through still water, or when the fragrance of an incense stick spreads across a room. The moving particles of the water or air collide with and spread the particles of the other substance.

Download INDIA's Best Study app NODIA

3.3 Effect of Temperature on Particle Movement

1. Heating matter increases the energy of its particles, causing them to move faster.
2. This is why substances dissolve and spread more quickly in hot water than in cold water.

4. SUMMARY OF PROPERTIES

Property	Solid	Liquid	Gas
Interparticle Spacing	Minimum	Slightly more than in solids	Maximum
Interparticle Attraction	Maximum	Weaker than in solids	Minimum (negligible)
Particle Packing	Closely packed	Loosely packed	Particles are free
Particle Movement	Vibrate in fixed positions	Move within a limited space	Move freely in all available space
Shape &Volume	Fixed shape, fixed volume	No fixed shape, fixed volume	No fixed shape, no fixed volume

NODIA

increases the water column for the taps below, resulting in higher pressure and a strong stream of water.

Questions:

1. What property of a liquid column determines the pressure it exerts at the bottom?
2. Why are overhead water tanks placed at a height?
3. Would a resident on the first floor receive water at a higher or lower pressure than a resident on the second floor? Explain why.

Ans :

1. The pressure exerted by a liquid in a vessel depends on the height of its column.
2. They are placed at a height so that the pressure in the taps is increased, resulting in a good stream of water from the taps.
3. The resident on the first floor would receive water at a higher pressure because the height of the water column from the tank to their tap is greater.

191. In a science experiment, two balloons are hung close to each other. When a student blows air hard into the narrow space between them, the balloons move towards each other instead of apart. This happens because the high-speed wind between the balloons creates a region of low air pressure, and the higher pressure of the surrounding air pushes them together.

Questions:

1. What is the relationship between high-speed winds and air pressure?
2. In the experiment, what causes the balloons to move towards each other?
3. How does this principle explain why weak roofs might be blown away during a high-speed storm?

Ans :

1. High-speed winds are accompanied by reduced air pressure.
2. Blowing air between the balloons creates a low-pressure area, and the higher air pressure surrounding the balloons pushes them towards each other.
3. During a storm, high-speed winds over a roof create a low-pressure area above it. The higher pressure inside the house can then push the roof upwards and blow it away.

Download INDIA's Best Study app NODIA

192. On a hot, humid day, warm, moist air rises rapidly, creating a low-pressure area. Cooler air rushes in to take its place. As the rising air cools, moisture condenses to form clouds. Strong upward and downward winds cause water droplets and ice particles to rub, building up static electric charges within the clouds that lead to a thunderstorm.

Questions:

1. What two conditions are important for the formation of thunderstorms?
2. How do static electric charges develop within storm clouds?
3. What is thunder, and how is it produced during a storm?

Ans :

1. Important requirements for the formation of thunderstorms are moisture and strong winds.
2. Strong winds blowing upwards and downwards facilitate rubbing between water droplets and ice particles, which causes static electric charges to develop within the clouds.
3. Thunder is the loud sound produced when lightning rapidly heats the air around it, causing the air to expand suddenly.

193. Over warm ocean waters, heated moist air rises, and water vapor condenses, releasing heat. This warms the air further, creating a very low-pressure area. Air from surrounding high-pressure regions rushes in. Due to the Earth's rotation, this moving air begins to spin, forming a large, rotating system of clouds and high-speed winds called a cyclone.

Questions:

1. What is the calm, low-pressure region at the center of a cyclone called?
2. Explain the role of condensing water vapor in strengthening a cyclone.
3. Why does a cyclone gradually lose its strength after it reaches land?

Ans :

1. The region of lowest pressure at the center is known as the eye of the cyclone.
2. When water vapor condenses into raindrops, it releases heat, which warms the air and causes it to rise further, creating an even lower pressure area that fuels the storm.
3. Once a cyclone reaches land, its source of moist air from the warm ocean is cut off, so it gradually loses its strength.

Click Here to Buy book on Amazon

pressure difference creates an upward force that can lift the roof off.

202. A student finds it much easier to cut an apple using the sharp edge of a knife rather than the blunt edge. Even though he applies the same force with his hand, the sharp edge has a very small surface area. This small area concentrates the force, creating a much higher pressure that is sufficient to slice through the apple easily.

Questions:

1. What is the SI unit of pressure?
2. Why is it easier to cut an apple with the sharp edge of a knife?
3. Explain why driving a nail into a piece of wood is easier using its pointed end rather than its head.

Ans :

1. The SI unit of pressure is newton/metre^2 (N/m^2), also called a pascal (Pa).
2. It is easier because when the area over which a force is applied is smaller, the resulting pressure is higher.
3. The pointed end has a very small area. Applying a force to the nail's head concentrates that force at the pointed tip, creating a very high pressure that can easily penetrate the wood.

203. A tall building is protected from lightning by a metallic rod called a lightning conductor, which is installed along its walls. The top of the rod is pointed and kept higher than the building, while the other end is buried deep in the ground. This rod provides an easy path for the transfer of electric charges from a lightning strike safely into the ground.

Questions:

1. What is the purpose of a lightning conductor?
2. Where are the two ends of the lightning conductor placed?
3. How does the lightning conductor protect the building from damage during a lightning strike?

Ans :

1. A lightning conductor is a device used to protect buildings from the effects of lightning.
2. One pointed end is kept higher than the highest point of the building, and the other end is buried deep in the ground.
3. It provides an easy and safe path for the transfer of the powerful electric charges from the lightning directly into the ground, preventing the charge from passing through and damaging the building.

****

NODIA

198. During a thunderstorm, lightning flashes brightly in the sky. This is a sudden flow of large electric charges between clouds, or between a cloud and the ground. To stay safe, it is advised to find a low-lying open area and crouch down, minimizing contact with the ground. Being inside a car is also comparatively safer during lightning.

Questions:

1. What is lightning?
2. Name one safe position to take in an open area during lightning.
3. Why is it dangerous to stand under a tall object like a tree during a thunderstorm?

Ans :

1. Lightning is a bright flash of light produced by a sudden flow of electric charges.
2. One should find a low-lying open area and crouch down.
3. Lightning is a flow of charge between clouds and the ground. Taller objects provide a shorter path for the charge to travel, making them more likely to be struck.

199. The force exerted by the atmospheric air column over an area of 15 cm × 15 cm is nearly equal to the weight of an object with a mass of 225 kg. We are not crushed under this enormous weight because the pressure inside our bodies is equal to the atmospheric pressure, balancing the pressure exerted from the outside.

Questions:

1. What prevents the large atmospheric pressure from crushing us?
2. What creates the pressure inside our bodies?
3. Would the atmospheric pressure be higher or lower on top of a high mountain compared to sea level? Explain.

Ans :

1. We are not crushed because the pressure inside our bodies is equal to the atmospheric pressure, which balances the pressure from the outside.
2. The pressure inside our body is caused by the movement of fluids and gases in our tissues and organs.
3. The pressure would be lower. The atmosphere extends many kilometers above the Earth's surface, so on a high mountain, the column of air above is shorter and weighs less.

Download INDIA's Best Study app NODIA

200. In 2020, Cyclone Amphan hit with peak wind speeds of 270 km/h, causing immense destruction. The strong winds pushed a wall of ocean water, known as a storm surge, onto coastal areas, causing massive flooding. The accompanying heavy rainfall caused rivers to overflow, and seawater contaminated drinking water sources and damaged farmland, leaving a long-lasting impact.

Questions:

1. Name two destructive effects of a cyclone.
2. How do strong winds during a cyclone cause coastal flooding?
3. Why is it important for people in cyclone-prone areas to follow weather reports and warnings from organizations like the IMD?

Ans :

1. Two destructive effects are strong winds and heavy rainfall.
2. Strong winds push ocean water towards the shore, creating a wall of water called a storm surge that can flood coastal areas.
3. Following warnings allows people to prepare and move to designated cyclone shelters, which can reduce the impact on life and property.

201. During a storm with high-speed winds, it is safer to keep the doors and windows of a house open. This allows the moving wind to pass through the house as well as over the roof. By doing so, the pressure difference between the inside of the house and over the roof is reduced, which helps prevent the roof from being blown off.

Questions:

1. What happens to air pressure when winds blow at high speed?
2. Why is it safer to keep windows and doors open during a storm?
3. If the doors and windows are kept closed, explain the forces that could cause the roof to be blown away.

Ans :

1. High-speed winds are accompanied by a reduced air pressure.
2. It reduces the pressure difference between the inside of the house and over the roof, which helps prevent the roof from being blown off.
3. The high-speed wind creates low pressure above the roof. The air inside the house remains at a higher pressure. This large

Downloaded from www.pdf.tube

The eye is a calm, low-pressure center, which can be misleading. It is dangerous because it is surrounded by the eyewall, which has the cyclone's strongest winds and heaviest rain. The storm is only half over when the eye passes.

LONG ANSWER QUESTIONS

179. Explain in detail the complete process of how a cyclone forms and strengthens.

Ans :

The formation of a cyclone is a complex process involving several key stages:

- **Initial Heating** : It begins over warm ocean waters when the water gets heated, causing the warm and moist air above it to rise.
- **Condensation and Heat Release** : As this moist air rises, the water vapor condenses to form raindrops, releasing a large amount of heat back into the atmosphere.
- **Pressure Drop** : This released heat warms the ascending air further, causing it to rise even faster and creating an area of even lower pressure.
- **Inflow and Spinning** : Air from surrounding high-pressure regions rushes in to fill the low-pressure area, and due to the Earth's rotation, this moving air begins to spin.
- **Intensification** : This cycle repeats, resulting in the creation of a very low-pressure center (the eye) with high-speed winds revolving around it, forming a powerful cyclone.

180. Describe how a thunderstorm develops, including the formation of clouds, wind, lightning, and thunder.

Ans :

The development of a thunderstorm involves the following steps:

- **Wind Circulation** : When land gets heated, the warm, moist air above it rises, creating a low-pressure area. Cooler air from surrounding regions flows in, gets heated, and also rises, establishing a continuous wind circulation.
- **Cloud Formation** : As the rising warm air expands and cools at higher altitudes, the moisture within it condenses to form water droplets, creating clouds.
- **Charge Separation** : Strong upward and downward winds cause water droplets and ice particles to rub against each other, generating static electric charges that separate within the clouds.
- **Lightning and Thunder** : When the buildup of these charges becomes very large, a sudden discharge occurs, producing a bright flash of lightning. This lightning rapidly heats the surrounding air, causing it to expand and create the loud sound of thunder.

NODIA

181. Provide a comprehensive explanation of atmospheric pressure, its magnitude, and why it doesn't crush us.

Ans :

Atmospheric pressure is the pressure exerted by the envelope of air surrounding the Earth. The key aspects are:

- **Magnitude** : The force exerted by the atmospheric air column over an area of just 15 cm $\times$ 15 cm is nearly equal to the force of gravity on an object of 225 kg. This demonstrates that the pressure is immense.
- **Internal Pressure Balance** : The reason we are not crushed by this massive weight is that the pressure inside our bodies is equal to the atmospheric pressure outside.
- **Source of Internal Pressure** : This internal pressure is caused by the movement of fluids and gases within the tissues and organs of our body, which pushes outward with a force that perfectly balances the inward force from the atmosphere.

182. Explain the relationship between pressure, force, and area with examples.

Ans :

The relationship between these three quantities is fundamental to understanding many physical phenomena:

- **Definition** : Pressure is defined as the force applied per unit area, expressed by the formula : Pressure = Force / Area. This means pressure is directly proportional to force and inversely proportional to area.
- **High Pressure Example** : It is easier to drive a nail with its pointed end because the small area concentrates the force, resulting in high pressure that allows it to penetrate surfaces easily.

CHAPTER 7

PARTICULATE NATURE OF MATTER

SUMMARY

1. THE FUNDAMENTAL IDEA : MATTER IS PARTICULATE

1.1 Matter is Made of Tiny Particles

All matter, whether it's a solid like chalk or a liquid like water, is composed of a very large number of extremely small particles. These basic units are called constituent particles. These particles are so small they cannot be seen even with an ordinary microscope. When a substance like sugar dissolves in water, it breaks down into its constituent particles, which then spread throughout the water.

Download INDIA's Best Study app NODIA

1.2 Characteristics of Particles

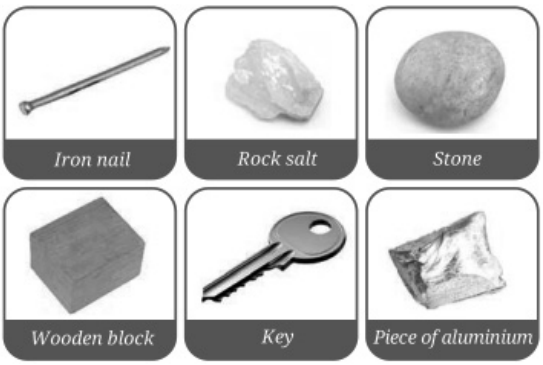
The behavior of matter is determined by two key properties of its particles:

1. Interparticle Spaces : There are spaces between the constituent particles of matter. When sugar dissolves, its particles occupy these spaces between the water particles.
2. Interparticle Attractions : The particles of matter are held together by forces of attraction. The strength of these forces determines the physical state of the substance (solid, liquid, or gas).

2. THE THREE STATES OF MATTER

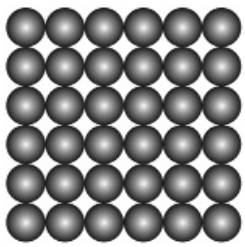
2.1 The Solid State

1. Properties : Solids have a definite shape and a definite volume.



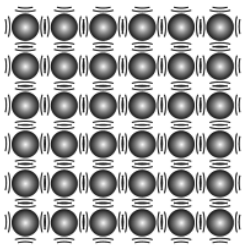
Some solid objects

2. Particle Arrangement : The particles in solids are tightly packed, and the interparticle attractions are very strong.



(a) Solid

3. Particle Movement : Due to strong attractions, particles in a solid are held in fixed positions and can only vibrate or oscillate. They cannot move freely past one another.



(b) Particles with increased vibrations

Click Here to Buy book on Amazon

194. A student takes a plastic bottle and makes four small holes around the bottom at the same height. After sealing the holes with tape, he fills the bottle with water. When he removes the tape, he observes water flowing out from all four holes. This experiment demonstrates that liquids exert pressure not only at the bottom but also on the sides of a container.

Questions:

1. What did the student observe when he removed the tape from the holes?
2. What can be inferred from the observation that water flows out from the sides of the bottle?
3. If the student made another hole higher up on the bottle, would the water flow out with more or less force than from the bottom holes?

Ans :

1. He observed water flowing out through the holes on the sides of the bottle.
2. It can be inferred that water exerts pressure on the sides of a container.
3. The water would flow out with less force because the pressure exerted by a liquid increases with the height (depth) of the water column above the hole.

195. In coastal areas, the land heats up faster than the sea during the day. The warmer air above the land rises, creating a low-pressure area. The cooler, denser air from the high-pressure region over the sea then blows towards the land, resulting in a sea breeze. This movement of air is a direct result of differences in air pressure.

Questions:

1. In which direction does air always move?
2. During the day, where does a low-pressure area develop in a coastal region?
3. At night, the land cools faster than the sea. Based on this, predict the direction of the wind (land breeze).

Ans :

1. Air moves from a region of high air pressure to a region of low air pressure.
2. During the day, a low-pressure area develops over the land because it gets heated faster than water.
3. At night, the water is warmer than the land, so a low-pressure area develops over the sea. As a result, the wind will blow from the high-pressure area on the land to the sea.

196. A student presses a rubber sucker firmly against a smooth, flat table. Most of the air between the cup and the surface is pushed out, creating reduced air pressure inside. The sucker sticks firmly to the surface because the atmospheric pressure outside the sucker is now much higher than the pressure inside, making it difficult to pull off.

Questions:

1. What is the pressure exerted by the air around us known as?
2. Why does the sucker stick to the smooth surface?
3. If the student tried to stick an identical sucker on a rough surface, would it stick as well? Explain why or why not.

Ans :

1. The pressure exerted by air is known as atmospheric pressure.
2. The sucker sticks because the pressure of the air surrounding it is higher than the reduced pressure of the air inside the sucker.
3. No, it would not stick as well. A rough surface would not allow a good seal, so air could leak back under the sucker, equalizing the pressure and preventing it from sticking.

197. Engineers designing a dam make its base much broader than its top. They know that the water stored in the dam exerts pressure both vertically on the floor and horizontally on the side walls. This horizontal water pressure is very large near the bottom of the dam, so a broad base is needed to withstand this immense force.

Questions:

1. In what directions does the water in a dam exert pressure?
2. Why is the base of a dam made much broader than the top?
3. How does the horizontal pressure exerted by the water change from the top of the dam to the bottom?

Ans :

1. The water exerts pressure horizontally on the side walls and vertically on the floor.
2. The base is made broader to withstand the large horizontal water pressure near the bottom.
3. The horizontal pressure increases with depth. It is lowest at the top of the water level and greatest at the bottom of the dam.

NODIA

NCERT EXERCISE

1. Choose the correct option :
The primary difference between solids and liquids is that the constituent particles are:
(i) Closely packed in solids, while they are stationary in liquids.
(ii) Far apart in solids and have fixed position in liquids.
(iii) Always moving in solids and have fixed position in liquids.
(iv) Closely packed in solids and move past each other in liquids.

Ans :

(iv) Closely packed in solids and move past each other in liquids.
In solids, particles are tightly packed due to very strong interparticle attractions, holding them in fixed positions where they can only vibrate. In liquids, the interparticle attractions are weaker, allowing the particles to move freely past one another.

2. Which of the following statements are true? Correct the false statements.
(i) Melting ice into water is an example of the transformation of a solid into a liquid.
(ii) Melting process involves a decrease in interparticle attractions during the transformation.
(iii) Solids have a fixed shape and a fixed volume.
(iv) The interparticle interactions in solids are very strong, and the interparticle spaces are very small.
(v) When we heat camphor in one corner of a room, the fragrance reaches all corners of the room.
(vi) On heating, we are adding energy to the camphor, and the energy is released as a smell.

Ans :

(i) True. Melting is the process where a solid converts into a liquid state.
(ii) True. During melting, thermal energy weakens the interparticle forces of attraction, allowing particles to move away from their fixed positions.
(iii) True. Solids have a definite shape and volume because their particles are held in fixed positions by strong attractive forces.
(iv) True. In solids, interparticle attractions are very strong, and the particles are closely packed, leaving minimum interparticle space.
(v) True. The particles of camphor fragrance mix with the constantly moving air particles, which helps them spread throughout the room.
(vi) False.
Correction : On heating, we add thermal energy to the camphor. This energy increases the movement of its particles, allowing them to escape and mix with the air, which is then perceived as smell. The energy is not "released as a smell."

NODIA

3. Choose the correct answer with justification. If we could remove all the constituent particles from a chair, what would happen?
(i) Nothing will change.
(ii) The chair will weigh less due to lost particles.
(iii) Nothing of the chair will remain.

Ans :

(iii) Nothing of the chair will remain.
Justification : All matter is composed of constituent particles. The chair itself is just a large number of these particles held together. If you remove all the particles that make up the chair, you remove the chair itself.

4. Why do gases mix easily, while solids do not?

Ans :

Gases mix easily because their constituent particles have negligible interparticle attractions and are completely free to move in all directions. This allows the particles of different gases to intermingle freely.

Solids do not mix easily because their particles are held in fixed positions by strong interparticle forces, preventing them from moving freely and mixing with particles of other solids.

5. When spilled on the table, milk in a glass tumbler, flows and spreads out, but the glass tumbler stays in the same shape. Justify this statement.

Ans :

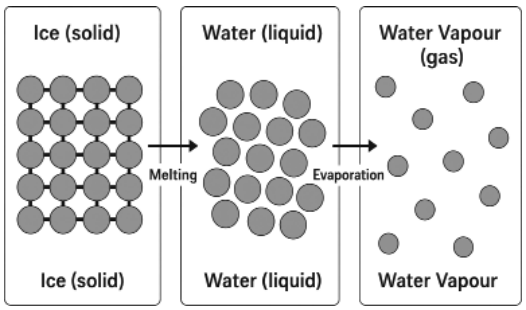
This statement is justified by the different properties of liquids and solids.
1. **Milk (Liquid) :** Milk is a liquid. Liquids do not have a fixed shape and take the shape of the container they are in. When spilled, the particles are free to move past one another, allowing the milk to flow and spread out.

Download INDIA's Best Study app NODIA

2. **Glass Tumbler (Solid) :** The glass tumbler is a solid. Solids have a definite shape and volume because their particles are held tightly in fixed positions. Therefore, the tumbler does not change its shape.

6. Represent diagrammatically the changes in the arrangement of particles as ice melts and transforms into water vapour.

Ans :

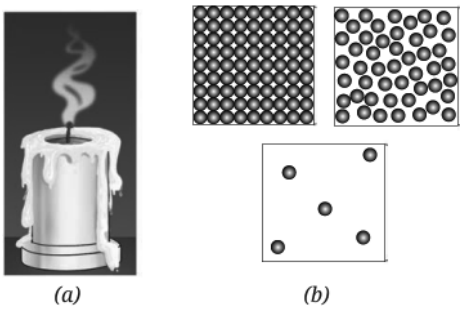


7. Draw a picture representing particles present in the following:
(i) Aluminium foil
(ii) Glycerin
(iii) Methane gas

Ans :

(i) Aluminium foil (Solid) : Particles are arranged in a regular, tightly-packed pattern.
(ii) Glycerin (Liquid) : Particles are close together but randomly arranged.
(iii) Methane gas (Gas) : Particles are very far apart and spread out randomly.

8. Observe Figure (a) which shows the image of a candle that was just extinguished after burning for some time. Identify the different states of wax in the figure and match them with Figure (b) showing the arrangement of particles.



Ans :

In the figure of the extinguished candle, three states of wax can be identified:
1. **Solid Wax :** This is the main body of the candle. Its particles are tightly packed in an orderly arrangement, corresponding to the solid state diagram (most ordered, closely packed particles).
2. **Liquid Wax :** This is the melted wax pooled around the wick. Its particles are close together but can move past each other, corresponding to the liquid state diagram (disordered, closely packed particles).
3. **Gaseous Wax :** This is the smoke or vapour rising from the wick. Its particles are far apart and move freely, corresponding to the gas state diagram (particles are far apart).

9. Why does the water in the ocean taste salty, even though the salt is not visible? Explain.

Ans :

The ocean tastes salty because salt dissolves in water. When salt dissolves, it breaks down into its individual constituent particles, which are extremely small and cannot be seen with the naked eye. These tiny salt particles spread out and occupy the interparticle spaces between the water particles. Even though the salt particles are invisible, their presence is distributed throughout the water, which is why we can taste them.

10. Grains of rice and rice flour take the shape of the container when placed in different jars. Are they solids or liquids? Explain.

Ans :

Both grains of rice and rice flour are solids.
While a large quantity of rice grains or rice flour can flow and take the shape of a container, each individual grain is a solid with its own fixed shape and volume. The overall collection of these tiny solids behaves like a fluid, but the properties of the substance are determined by its individual particles, which remain in the solid state.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

MULTIPLE CHOICE QUESTION

11. The fact that a single piece of chalk can be ground into a fine powder, where each tiny grain is still chalk, suggests that matter is _____.
(A) Is composed of a large number of smaller units or particles
(B) Is continuous and therefore cannot be broken down
(C) Is always found naturally in a permanent liquid state
(D) Changes into a new substance entirely upon grinding

Ans :

(A) Is composed of a large number of smaller units or particles
Grinding a substance like chalk breaks it into progressively smaller pieces without changing its chemical nature. This demonstrates that the larger piece of chalk was made up of a vast number of tiny constituent particles.

12. What is the term for the basic building blocks or the smallest units that make up a larger piece of a substance?
(A) Molecules
(B) Grains
(C) Specks
(D) Constituent particles

Ans :

(D) Constituent particles
A constituent particle is the fundamental unit of which a substance is composed. A large piece of any material, like chalk or sugar, is an aggregation of a massive number of these extremely small constituent particles.

13. When sugar dissolves in water, the sugar particles can no longer be seen, but their presence can be sensed by taste. This is because the sugar _____.
(A) Quickly evaporates from the water into the surrounding air
(B) Reacts with water to form a completely new substance
(C) Breaks down into constituent particles too small to be seen
(D) Sinks and settles at the very bottom of the container

Ans :

(C) Breaks down into constituent particles too small to be seen
During dissolution, sugar crystals break apart into their individual constituent particles. These particles are incredibly small, far too tiny to be visible even with a microscope, but they are still present and distributed throughout the water.

14. Why do solids like an iron nail have a definite shape and volume?
(A) The constituent particles are far apart and move randomly.
(B) Particles are packed tightly and held in fixed positions.
(C) The interparticle forces of attraction are extremely weak.
(D) The constituent particles can slide past one another easily.

Ans :

(B) Particles are packed tightly and held in fixed positions.
In solids, the constituent particles are held together by very strong interparticle forces of attraction. This holds the particles in fixed positions, allowing them only to vibrate, which gives solids their rigid structure and definite shape.

15. What are the spaces between the constituent particles of matter called?
(A) Interparticle spaces
(B) Interparticle attractions
(C) Constituent gaps
(D) Particle voids

Ans :

(A) Interparticle spaces
Matter is not continuous; there are empty spaces between the particles that make it up. These empty spaces are known as interparticle spaces, and their size varies depending on the state of matter.

NODIA

16. The ancient Indian philosopher Acharya Kanad proposed the idea of tiny, indivisible eternal particles called _____.
(A) Molecules (B) Tattvas
(C) Sutras (D) Parmanu

Ans :

(D) Parmanu
Acharya Kanad was an ancient Indian philosopher who is credited with first speaking about the idea of an atom, which he called 'Parmanu'. He believed matter was composed of these tiny, indivisible particles.

(C) Not only at the surface but also within the liquid
Unlike evaporation, which is a surface phenomenon, boiling occurs throughout the entire bulk of the liquid. This is observed as the formation of bubbles of vapor within the liquid, which then rise to the surface.

41. The process where vapor formation occurs slowly and only at the surface of a liquid at any temperature below its boiling point is known as _____.
(A) Evaporation (B) Condensation
(C) Melting (D) Boiling

Ans :

(A) Evaporation
Evaporation is the conversion of a liquid to its vapor state from the surface of the liquid. It is a slower process than boiling and can happen at any temperature, as some surface particles will always have enough energy to escape.

42. Definite shape is to solid as indefinite shape is to _____.
(A) Rock (B) Crystal
(C) Metal (D) Fluid

Ans :

(D) Fluid
This analogy contrasts a key physical property. Solids have a definite shape. The term fluid collectively describes substances that do not have a definite shape, namely liquids and gases, as they can flow and conform to their container.

43. When washing clothes stained with oil, soap particles surround the oil particles and help lift them off the fabric. This everyday process is a crucial application of the _____.
(A) The magnetic nature of all types of matter
(B) The particulate nature of matter at a micro level
(C) The general properties of the solid state of matter
(D) The general properties of the gaseous state of matter

Ans :

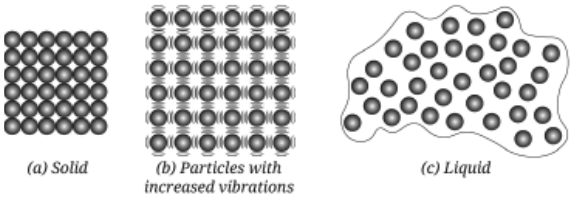
(B) The particulate nature of matter at a micro level
The cleaning action of soap works at a particle level. Numerous individual soap particles interact with individual oil particles, with one end of the soap particle attaching to the oil and the other to water, demonstrating a practical use of particulate interactions.

44. The movement of particles in a substance increases when heat is provided. This is because heat energy increases the _____ of the particles.
(A) Size
(B) Mass
(C) Kinetic energy (energy of motion)
(D) Attractive force

Ans :

(C) Kinetic energy (energy of motion)
Heat is a form of energy. When a substance is heated, its particles absorb this energy, which is converted into kinetic energy. This increased kinetic energy results in the particles moving or vibrating more rapidly.

45. Figure shows the transition of a substance from solid to liquid upon heating. What is happening in diagram (b) compared to diagram (a)?



(A) The particles are vibrating more vigorously.
(B) The particles are getting smaller.
(C) The particles are moving farther apart to become a gas.
(D) The number of particles is increasing.

Ans :

(A) The particles are vibrating more vigorously.
Diagram (a) shows particles in a solid, vibrating in fixed positions. Diagram (b) illustrates the effect of heating this solid; the particles have absorbed energy and are now vibrating much more vigorously about their fixed positions, just before melting.

46. A student takes three tumblers with hot, room temperature, and ice-cold water and drops a crystal of potassium permanganate in each. In which tumbler will the color spread the fastest?
(A) The ice-cold water.
(B) The room temperature water.
(C) It will spread at the same rate in all three.
(D) The hot water.

Ans :

Click Here to Buy book on Amazon

Ans :

(C) Because there are large interparticle spaces between its particles.
In the gaseous state, particles are far apart from each other, resulting in large empty spaces between them. Applying external pressure can easily force these particles closer together, reducing the volume, which makes gases highly compressible.

24. Because they can flow and do not retain a fixed shape, liquids and gases are collectively classified as _____.
(A) Solids
(B) Materials
(C) Substances
(D) Fluids

Ans :

(D) Fluids
The term 'fluid' is used to describe any substance that can flow. Since both liquids and gases have particles that can move past one another, they both exhibit the property of fluidity, distinguishing them from solids.

25. The spreading of potassium permanganate color throughout a tumbler of water without stirring is evidence that _____.
(A) Water particles are in constant motion
(B) Water particles are stationary
(C) Potassium permanganate is lighter than water
(D) Water has very strong interparticle attractions

Ans :

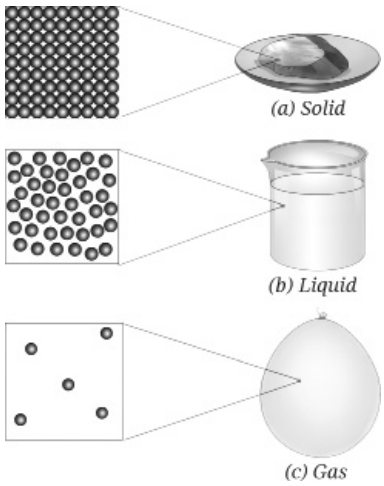
(A) Water particles are in constant motion
The particles of water are continuously moving and colliding. They hit the particles of potassium permanganate, knocking them off the grain and spreading them throughout the entire volume of the water, a process known as diffusion.

26. The fragrance of a hot sizzling meal reaches you from several meters away, but you have to go close to smell cold food. Why?
(A) Cold food does not have any detectable fragrance.
(B) The particles of hot food have more energy and move faster.
(C) Your sense of smell works better at much higher temperatures.
(D) The fragrance particles of cold food are significantly heavier.

Ans :

(B) The particles of hot food have more energy and move faster.
Heating a substance increases the kinetic energy of its particles, causing them to move faster. The fragrance particles from hot food travel and mix with air particles more quickly, allowing the smell to spread over a greater distance in a shorter time.

27. Figure shows magnified schematic pictures of the three states of matter. Which diagram (a, b, or c) represents the state with the maximum interparticle spacing?



(A) Diagram (a) - Solid
(B) Diagram (b) - Liquid
(C) Diagram (c) - Gas
(D) Both (b) and (c)

Ans :

(C) Diagram (c) - Gas
Diagram (c) depicts particles that are far apart from each other with large empty spaces between them. This arrangement is characteristic of the gaseous state, which has the maximum interparticle spacing and weakest interparticle forces.

NODIA

28. What is the main difference between boiling and evaporation?
(A) Boiling occurs at the surface, while evaporation occurs throughout.
(B) Evaporation is a very fast process, while boiling is quite slow.
(C) Boiling turns a liquid to a solid, while evaporation turns it to a gas.
(D) Boiling is at a specific temperature; evaporation is at all temperatures.

Ans :

53. Which property of gases explains why the smell of perfume sprayed in one corner of a room soon fills the entire room?
(A) Gases have a definite and unchanging volume.
(B) Gas particles are held in completely fixed positions.
(C) Gas particles have very strong attractions for each other.
(D) Gas particles move freely and randomly in all available space.

Ans :

(D) Gas particles move freely and randomly in all available space.
The particles of the perfume vapor (a gas) are in constant, rapid, and random motion. They spread out from the point of origin, mixing with the air particles and eventually distributing themselves throughout the entire volume of the room.

54. The term 'Suspended Particulate Matter' (SPM) in the context of air pollution refers to _____.
(A) Tiny dust particles suspended in the air
(B) The constituent particles of air like atoms and molecules
(C) Water vapor particles in the air
(D) Gaseous pollutants like carbon dioxide

Ans :

(A) Tiny dust particles suspended in the air
In the context of pollution, 'particulate matter' refers to microscopic solid or liquid particles suspended in the air. These are much larger than the constituent atoms and molecules of the air itself but are small enough to remain airborne.

55. A solid gets converted into a liquid at its melting point because the thermal energy is used to _____.
(A) Increase the mass of the particles
(B) Overcome the attractive forces between particles
(C) Make the particles smaller
(D) Change the particles into a new substance

Ans :

(B) Overcome the attractive forces between particles
At the melting point, the added heat energy (thermal energy) is not used to raise the temperature further but to provide the particles with enough energy to break free from the strong attractive forces that hold them in the rigid solid lattice.

56. Grinding chalk is to physical change as dissolving sugar is to _____.
(A) Chemical change
(B) State change
(C) Physical process
(D) Particle creation

Ans :

(C) Physical process
Both grinding chalk and dissolving sugar are physical processes. In both cases, the substance is broken down into smaller particles, but its fundamental chemical identity does not change. No new substances are formed.

Download INDIA's Best Study app NODIA

57. Which property is common to both liquids and gases but not solids?
(A) They have a definite volume.
(B) They have a definite shape.
(C) Their particles are in fixed positions.
(D) They can flow (are fluids).

Ans :

(D) They can flow (are fluids).
Both liquids and gases are classified as fluids because their particles are not held in fixed positions and can move past one another. This ability to move allows them to flow and take the shape of their container, a property that solids lack.

58. A student places some solid iodine crystals in a closed gas jar. After some time, the entire jar is filled with purple iodine vapor. This demonstrates that _____.
(A) Solids can have weak interparticle forces, allowing particles to escape.
(B) Iodine undergoes a chemical reaction with the air inside the jar.
(C) The gas jar was likely not sealed properly, allowing vapor to enter.
(D) Iodine is actually a liquid at standard room temperature.

Ans :

(A) Solids can have weak interparticle forces, allowing particles to escape.
This process, called sublimation, shows that even in some solids, particles have enough energy to escape directly into the gas phase. The vapor then spreads out due to the constant motion of gas particles to fill the entire jar.

Downloaded from www.pdf.tube

35. What happens to interparticle forces when the distance between particles increases slightly?
(A) The forces increase slightly.
(B) The forces remain the same.
(C) The forces decrease drastically.
(D) The forces change from attractive to repulsive.

Ans :

(C) The forces decrease drastically.
Interparticle forces are highly dependent on the distance between particles. Even a small increase in the distance can cause a significant and drastic reduction in the strength of these attractive forces.

36. How does the movement of particles in a solid differ from the movement in a liquid?
(A) Solid particles move freely; liquid particles only vibrate.
(B) Both solid and liquid particles are stationary.
(C) Both solid and liquid particles move freely in all directions.
(D) Solid particles only vibrate; liquid particles can move within a limited space.

Ans :

(D) Solid particles only vibrate; liquid particles can move within a limited space.
In solids, particles are locked into fixed positions and can only vibrate. In liquids, particles have enough energy to overcome these fixed positions and can move around and slide past each other, although they are still confined within the liquid's volume.

37. To demonstrate that gases occupy the entire available space, an activity uses smoke collected in one gas jar which then spreads into a second empty jar placed on top. The smoke is used to _____.
(A) To represent the gaseous state and observe particle motion
(B) To show that the individual gas particles are visible
(C) To create a powerful chemical reaction between the two jars
(D) To quickly heat the air that is inside the second empty jar

Ans :

(A) To represent the gaseous state and observe particle motion
Since the constituent particles of gases are invisible, the tiny, visible smoke particles are used as a proxy. The movement and spreading of the smoke particles, as they are hit by invisible air particles, helps us visualize how a gas expands to fill all available space.

38. When you push the plunger of a sealed syringe filled with air, the volume of air decreases. This demonstrates that _____.
(A) The air that is inside the syringe is actually a liquid.
(B) Air is compressible due to its large interparticle spaces.
(C) Air particles can be destroyed by applying enough pressure.
(D) The syringe is leaking, allowing the air to escape slowly.

Ans :

(B) Air is compressible due to its large interparticle spaces.
The large empty spaces between gas particles mean they can be easily forced closer together. Pushing the plunger applies pressure, which reduces the volume by decreasing the interparticle spaces, proving that gases are compressible.

39. Which statement about the particulate nature of matter is INCORRECT?
(A) Matter is composed of extremely small particles.
(B) The particles of matter are in constant motion.
(C) Particles of matter are held together by forces of attraction.
(D) There are no spaces between the particles of matter.

Ans :

(D) There are no spaces between the particles of matter.
A key characteristic of the particulate nature of matter is the existence of interparticle spaces. These spaces are smallest in solids, larger in liquids, and largest in gases, but they are always present.

40. At the boiling point, the formation of vapor is very fast and occurs _____.
(A) Only at the surface of the liquid
(B) Only at the bottom of the liquid
(C) Not only at the surface but also within the liquid
(D) Only when the liquid is stirred

Ans :

NODIA

17. What happens to the interparticle forces of attraction when a solid is heated and melts into a liquid?
(A) The forces become stronger.
(B) The forces remain unchanged.
(C) The forces get weakened.
(D) The forces disappear completely.

Ans :

(C) The forces get weakened.
Heating a solid increases the vibration of its particles. At the melting point, the particles gain enough energy to overcome the strong attractive forces holding them in fixed positions, allowing the forces to weaken and the substance to become a liquid.

18. The minimum temperature at which a solid melts to become a liquid at atmospheric pressure is called its _____.
(A) Boiling point
(B) Melting point
(C) Freezing point
(D) Evaporation point

Ans :

(B) Melting point
The melting point is the specific temperature at which a substance transitions from the solid state to the liquid state. At this temperature, the particles gain enough energy to break free from their fixed positions in the solid structure.

19. How do liquids differ from solids in terms of shape and volume?
(A) Liquids have no fixed shape but a fixed volume.
(B) Liquids have a fixed shape but no fixed volume.
(C) Liquids have both a fixed shape and a fixed volume.
(D) Liquids have neither a fixed shape nor a fixed volume.

Ans :

(A) Liquids have no fixed shape but a fixed volume.
The particles in a liquid are free to move past one another, allowing the liquid to take the shape of its container. However, the particles are still held closely enough by attractive forces that the liquid maintains a definite volume.

20. You can move your finger through water, but not through a wooden block. This indicates that _____.
(A) Interparticle attractions are stronger in water than in wood
(B) Water has no interparticle attractions
(C) Wood is made of smaller particles than water
(D) Interparticle attractions are weaker in liquids than in solids

Ans :

(D) Interparticle attractions are weaker in liquids than in solids
The ability to move through a substance depends on the strength of the forces holding its particles together. The weaker interparticle attractions in a liquid like water allow its particles to be displaced easily, unlike the strong forces in a solid.

21. What is the melting point of ice according to Table 7.1?
(A) 100°C (B) 0°C
(C) 133°C (D) 1538°C

Ans :

(B) 0°C
According to the provided Table 7.1, the melting point of ice is listed as 0°C. This is the standard temperature at which solid water (ice) transitions into liquid water at atmospheric pressure.

22. Which of the following statements about the gaseous state is incorrect?
(A) Gases have a fixed volume.
(B) Gases do not have a fixed shape.
(C) Interparticle attractions in gases are negligible.
(D) Gas particles move freely in all directions.

Ans :

(A) Gases have a fixed volume.
Gases have neither a fixed shape nor a fixed volume. Their particles have very weak attractions and move randomly and freely, causing them to expand and occupy the entire available space of any container they are in.

23. Why is a gas, like the air in a syringe, easily compressible?
(A) Because its individual particles are extremely heavy.
(B) Because its particles are held by strong attractive forces.
(C) Because there are large interparticle spaces between its particles.
(D) Because its constituent particles are in a fixed, rigid position.

Click Here to Buy book on Amazon

(D) The hot water.
The rate of diffusion depends on the kinetic energy of the particles. The particles in hot water are moving much faster than in cold water. These fast-moving water particles will collide with and spread the potassium permanganate particles more quickly.

47. A substance has particles that are a little loosely packed, have attractions slightly weaker than solids, and can move within a limited space. This substance is a _____.
(A) Solid
(B) Is a liquid with particles that can move in a limited space
(C) Gas
(D) Plasma

Ans :

(B) Is a liquid with particles that can move in a limited space
These properties are characteristic of the liquid state. The particles are close but not fixed, allowing for movement and flow, but the attractions are still strong enough to maintain a definite volume, distinguishing it from both solids and gases.

48. What is the main difference in interparticle attraction between liquids and gases?
(A) It is maximum in liquids and minimum (negligible) in gases.
(B) It is negligible in liquids and maximum in the gaseous state.
(C) It is weaker in liquids than solids, but minimum in gases.
(D) It is exactly the same strength in both liquids and gases.

Ans :

(C) It is weaker in liquids than solids, but minimum in gases.
In liquids, attractive forces are still significant enough to hold particles together in a definite volume. In gases, the particles are so far apart and moving so fast that the attractive forces between them are considered negligible.

49. Which of the following statements about the particle nature of matter is incorrect?
(A) The space between particles is filled with air.
(B) Particles of matter are extremely small.
(C) Particles of matter are in constant motion.
(D) Particles of matter attract each other.

Ans :

(A) The space between particles is filled with air.
The interparticle spaces are voids; they contain nothing at all, not even air. The particles of air are themselves matter and would occupy these spaces, but the spaces themselves are empty.

50. The thermal energy of particles is lowest in which state of matter?
(A) Solid state
(B) Liquid state
(C) Gaseous state
(D) It is equal in all states.

Ans :

(A) Solid state
Thermal energy is related to the kinetic energy (motion) of particles. In the solid state, particles have the least motion (only vibrations), so their thermal energy is the lowest. As a substance is heated, its thermal energy increases.

51. In the solid state, interparticle spacing is _____, while in the gaseous state, it is _____.
(A) Maximum, minimum
(B) Minimum, maximum
(C) Moderate, maximum
(D) Minimum, moderate

Ans :

(B) Minimum, maximum
The arrangement of particles defines the states of matter. Solids have particles packed as closely as possible, resulting in minimum interparticle spacing. Gases have particles that are very far apart, leading to maximum interparticle spacing.

52. If you attempt to compress water in a sealed syringe, you will find it is practically incompressible. This is because _____.
(A) Water is a gas
(B) Water particles repel the syringe plunger
(C) The particles in a liquid are already quite close together
(D) The interparticle forces in water are negligible

Ans :

(C) The particles in a liquid are already quite close together
Unlike gases, which have large empty spaces between particles, the particles in a liquid are closely packed. There is very little free space into which the particles can be squeezed, making liquids nearly incompressible.

Downloaded from www.pdf.tube

(D) Boiling is at a specific temperature; evaporation is at all temperatures.
Boiling is a rapid vaporization process that happens at a specific temperature (the boiling point) throughout the bulk of the liquid. Evaporation is a slower process that occurs only from the surface of the liquid and can happen at any temperature.

Download INDIA's Best Study app NODIA

29. When solids are heated, their particles _____.
(A) Vibrate more vigorously
(B) Stop moving completely
(C) Start moving freely in all directions
(D) Become smaller in size

Ans :

(A) Vibrate more vigorously
In a solid, particles are held in fixed positions and can only oscillate or vibrate. When the solid is heated, the particles absorb energy and their vibrations become much more vigorous and rapid.

30. Tightly packed is to solid as _____ is to gas.
(A) Loosely packed
(B) Free to move
(C) Fixed position
(D) Negligible vibration

Ans :

(B) Free to move
This analogy relates the state of matter to the condition of its particles. In a solid, particles are tightly packed. In a gas, the defining characteristic is that the particles are far apart and completely free to move randomly in any direction.

31. Which of the following statements about liquids is incorrect?
(A) They have a definite volume.
(B) They take the shape of the container.
(C) Their particles are held in fixed positions.
(D) The interparticle attractions are weaker than in solids.

Ans :

(C) Their particles are held in fixed positions.
It is the particles in a solid that are held in fixed positions. In a liquid, the particles are not fixed; they have enough energy to slide past one another, which allows the liquid to flow and take the shape of its container.

32. A student adds two teaspoons of sand to a glass of water and stirs. The student observes that the sand particles do not disappear and the water level rises. This is because sand _____.
(A) Dissolves completely and disappears in the water
(B) Has particles that fit into water's interparticle spaces
(C) Is a liquid substance at standard room temperature
(D) Is insoluble and its particles occupy extra space

Ans :

(D) Is insoluble and its particles occupy extra space
Unlike sugar, sand is insoluble in water. Its particles cannot break down and fit into the spaces between water particles. Instead, the sand particles simply displace the water and occupy their own volume, causing the total volume and water level to increase.

33. What determines the physical state of a substance?
(A) The strength of the interparticle forces of attraction.
(B) The color of the substance.
(C) The size of the constituent particles.
(D) The weight of the substance.

Ans :

(A) The strength of the interparticle forces of attraction.
The physical state of matter solid, liquid, or gas is ultimately decided by the balance between the kinetic energy of the particles and the strength of the attractive forces between them. Strong forces result in solids, while negligible forces result in gases.

34. The process of grinding chalk is a _____ change, as it only reduces the _____ of the chalk specks.
(A) Chemical, substance
(B) Physical, size
(C) Chemical, color
(D) Physical, density

Ans :

(B) Physical, size
Grinding is a physical change because the chemical identity of the chalk does not change; it remains chalk. The only property that is altered is a physical one, specifically the size of the individual particles.

NODIA

59. What is an exception to the general rule that particles in a liquid state are farther apart than in the solid state?
(A) Iron
(B) Ice
(C) Urea
(D) Sugar

Ans :

(B) Ice
When water freezes into ice, its particles arrange themselves in a crystal lattice structure that takes up more space, making solid ice less dense than liquid water.

60. Why can't sand be dissolved in water like sugar can?
(A) The individual particles of sand are much too large.
(B) Sand is already a liquid, so it cannot dissolve further.
(C) Water particles cannot pull the sand particles from the grain.
(D) Sand has a chemical property that actively repels water.

Ans :

(C) Water particles cannot pull the sand particles from the grain.
For a substance to dissolve, the attraction between the solvent (water) particles and the solute particles must be strong enough to overcome the forces holding the solute particles together. In the case of sand, these forces are too strong for the water particles to break.

61. Which of the following is an INCORRECT pairing of a state of matter with its properties?
(A) Gas : Particles are free to move, definite shape.
(B) Solid : Maximum interparticle attraction, minimum interparticle spacing.
(C) Liquid : Definite volume, takes the shape of the container.
(D) Solid : Particles vibrate, definite volume.

Ans :

(A) Gas : Particles are free to move, definite shape.
Gases do not have a definite shape. A key characteristic of the gaseous state is that its particles move freely and randomly to take on both the shape and the entire volume of whatever container they are in.

62. At the melting point, _____ energy is used to overcome the attractive forces, allowing the solid to change into a _____.
(A) Kinetic, gas
(B) Thermal, liquid
(C) Potential, solid
(D) Chemical, vapor

Ans :

(B) Thermal, liquid
During melting, the added thermal (heat) energy increases the particle vibrations to the point where they can overcome the forces holding them in a fixed lattice. This allows the substance to transition from the solid to the liquid phase.

63. How does the compressibility of liquids compare to that of gases?
(A) Liquids are more compressible than gases.
(B) Both are equally compressible.
(C) Liquids are practically incompressible, while gases are highly compressible.
(D) Gases are incompressible, while liquids are highly compressible.

Ans :

(C) Liquids are practically incompressible, while gases are highly compressible.
The large interparticle spaces in gases allow their volume to be easily reduced under pressure. In liquids, the particles are already close together, leaving very little empty space, which makes them almost incompressible.

64. Why does the strength of interparticle attractions ultimately decide the physical state of a substance?
(A) Because strong attractions between particles lead to a gaseous state.
(B) Because very weak attractions between particles lead to a solid state.
(C) Because the attractions change the chemical nature of the particles.
(D) Strong attractions create solids, while negligible attractions create gases.

Ans :

(D) Strong attractions create solids, while negligible attractions create gases.
The state of matter is a direct consequence of the balance between particle energy and interparticle forces. Very strong forces lock particles into a solid structure. Weaker forces allow for liquid flow. Negligible forces result in the free movement characteristic of a gas.

Click Here to Buy book on Amazon

Gases are highly compressible due to large interparticle spaces. The melting point is the temperature for solid-to-liquid transition. The boiling point is for liquid-to-gas transition. Acharya Kanad conceptualized the atom.

TRUE AND FALSE

85. Matter is made up of large particles that can be easily observed with an ordinary microscope.

Ans :

False
Matter is composed of extremely small particles that are so tiny they cannot be seen even with an ordinary microscope.

86. Solids have a definite shape and volume because their constituent particles are tightly packed and held by strong attractions.

Ans :

True
In solids, the particles are tightly packed, and the interparticle attractions are very strong, which gives them a definite shape and volume.

Download INDIA's Best Study app NODIA

87. The particles within a solid are completely stationary and have no movement.

Ans :

False
The particles in a solid are not completely still; they can only vibrate or oscillate about their fixed positions.

88. Liquids have a definite volume but take the shape of the container they are in.

Ans :

True
Liquids have a definite volume, but because their particles can move freely within a limited space, they do not have a fixed shape.

89. The interparticle attractions in gases are very strong, which is why gases have a fixed volume.

Ans :

False
The interparticle attractions in gases are negligible, allowing particles to move freely, which results in gases having no fixed shape or volume.

90. When sugar is dissolved in water, its particles break down and occupy the empty spaces between the water particles.

Ans :

True
When sugar dissolves, it breaks up into its constituent particles, which are then able to fit into the interparticle spaces between the water particles.

91. Gases are easily compressed because there are large interparticle spaces between their particles.

Ans :

True
Gas particles have a lot of space between them, which allows them to be forced closer together when external pressure is applied.

92. Liquids are just as compressible as gases.

Ans :

False
Water and other liquids are practically incompressible because their particles are much closer together than the particles in a gas.

NODIA

93. The melting point is the temperature at which a liquid freezes to become a solid.

Ans :

False
The melting point is the minimum temperature at which a solid melts to become a liquid at atmospheric pressure.

94. The attractive forces between particles are strongest in solids, weaker in liquids, and weakest (negligible) in gases.

Ans :

True
The interparticle attractions are the strongest in solids, a little weaker in liquids, and the weakest in gases, which determines their physical properties.

95. The constituent particles in liquids and gases are in constant, random motion.

Ans :

True

71. When a syringe filled with water is sealed and the plunger is pushed, the plunger barely moves. This is because liquids _____.
(A) Have particles that are very far apart
(B) Have very weak interparticle attractions
(C) Are practically incompressible
(D) Quickly turn into a gas under pressure

Ans :

(C) Are practically incompressible
The particles in a liquid are packed closely together, leaving very little empty space. Because there is no room to squeeze the particles closer, applying pressure has a negligible effect on the liquid's volume, making it almost incompressible.

72. Looking at the summary chart (page 112), which state of matter has the maximum interparticle attraction?
(A) Liquid
(B) Gas
(C) Fluid
(D) Solid

Ans :

(D) Solid
The chart explicitly states that for the solid state, "Interparticle attraction is maximum." This strong attraction is what locks the particles into a fixed, rigid structure, giving solids their definite shape and making them incompressible.

73. In liquids, particles are a little _____ packed than in solids, and the movement of particles is restricted to a _____ space.
(A) Loosely, limited
(B) More tightly, wider
(C) Loosely, unlimited
(D) More tightly, limited

Ans :

(A) Loosely, limited
Compared to solids, liquid particles are less orderly and more loosely packed. While they can move, their movement is confined by the surface of the liquid, restricting them to the limited space of the liquid's volume.

74. A single tiny grain of sugar is made up of how many constituent particles?
(A) One or two
(B) Millions and millions
(C) About a hundred
(D) Exactly one thousand

Ans :

(B) Millions and millions
The text emphasizes the incredibly small size of constituent particles by stating that even a tiny, visible grain of sugar is itself composed of millions upon millions of these fundamental particles, which are invisible to the naked eye.

75. The idea that matter is composed of a large number of extremely small particles is supported by which observation?
(A) The fact that wood can be burned.
(B) The observation that water is a liquid.
(C) The dissolution of sugar in water.
(D) The high melting point of iron.

Ans :

(C) The dissolution of sugar in water.
The disappearance of visible sugar crystals into water, while the taste remains, strongly supports the particulate theory. It suggests that the sugar breaks down into particles too small to see, which then mix with the water particles.

76. If you want to demonstrate that particle motion is faster at higher temperatures, which experiment would be most suitable?
(A) Compressing air in a syringe.
(B) Dissolving salt in water until it is saturated.
(C) Melting a block of ice.
(D) Comparing the rate of color spreading from a tea bag in hot and cold water.

Ans :

(D) Comparing the rate of color spreading from a tea bag in hot and cold water.
This directly tests the effect of temperature on particle motion. The color from the tea bag will spread (diffuse) much faster in the hot water because its particles have higher kinetic energy and are moving more rapidly.

77. What is the name of the work in which Acharya Kanad wrote about his idea of 'Parmanu'?
(A) Ayurveda
(B) Vaisheshika Sutras
(C) Vedas
(D) Ramayana

Ans :

(B) Vaisheshika Sutras
Acharya Kanad's philosophical ideas about matter and the indivisible particles he called 'Parmanu' were documented in his work, the Vaisheshika Sutras.

Downloaded from www.pdf.tube

78. A major difference in particle arrangement between a solid and a gas is that _____.
(A) Solid particles are packed and orderly; gas particles are far apart and random.
(B) Solid particles are generally smaller than individual gas particles.
(C) Gas particles are arranged in a fixed pattern, while solid ones are random.
(D) Solid particles tend to move much faster than individual gas particles.

Ans :

(A) Solid particles are packed and orderly; gas particles are far apart and random.
The arrangement of particles is a key differentia tor between states of matter. Solids are characterized by a tightly packed, orderly lattice. Gases are characterized by particles that are widely separated and move in a random, chaotic manner.

79. The fact that spilled water eventually disappears over time, even at room temperature, is due to the process of _____.
(A) Boiling (B) Melting
(C) Condensation (D) Evaporation

Ans :

(D) Evaporation
Evaporation is the process where a liquid turns into a gas at its surface at temperatures below the boiling point. The water molecules gain enough energy from the surroundings to escape into the air as water vapor, causing the puddle to disappear.

MATCHING TYPE QUESTIONS

80. Match the fundamental properties of matter's particles with their correct descriptions.

	Column A		**Column B**
1	Interparticle Spacing	A	Explains why the fragrance of an incense stick spreads across a room.
2	Interparticle Attraction	B	The extremely small, basic building blocks that make up a larger piece of a substance.
3	Constant Motion of Particles	C	The empty spaces between the constituent particles of a substance.
4	Constituent Particles	D	The forces that hold the particles of matter together, which are strongest in solids.

Options
(a) 1-C, 2-D, 3-A, 4-B
(b) 1-D, 2-A, 3-B, 4-C
(c) 1-B, 2-C, 3-D, 4-A
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(a) 1-C, 2-D, 3-A, 4-B
Interparticle spacing refers to the empty gaps between particles. Interparticle attraction is the force holding particles together. The constant motion of particles causes substances to mix and spread. Constituent particles are the basic units of matter.

81. Match the state of matter with its defining physical properties.

	Column A		**Column B**
1	Solid	A	Has a definite volume but takes the shape of its container because its particles can move within a limited space.
2	Liquid	B	A classification for both liquids and gases, as their particles are not in fixed positions and can flow.
3	Gas	C	Has a definite shape and volume because its particles are tightly packed and held in fixed positions.
4	Fluid	D	Has no definite shape or volume because its particles are free to move and fill any available space.

Options
(a) 1-D, 2-B, 3-A, 4-C
(b) 1-A, 2-C, 3-B, 4-D
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-D, 3-C, 4-A

Ans :

NODIA

(c) 1-C, 2-A, 3-D, 4-B
Solids have a fixed shape and volume due to strong particle attractions. Liquids have a fixed volume but take the container's shape. Gases fill any container, having no fixed shape or volume. Fluids are substances that can flow.

82. Match the particle behavior with the corresponding state of matter or phenomenon.

	Column A		**Column B**
1	Particles in a Solid	A	This process demonstrates that there are empty spaces between water particles for sugar particles to occupy.
2	Particles in a Liquid	B	Particles are far apart with negligible attraction, moving randomly to fill the entire container.
3	Particles in a Gas	C	Particles are loosely packed and can move and slide past one another within the volume of the liquid.
4	Dissolving Sugar in Water	D	Particles are closely packed and can only vibrate about their fixed positions. Options

Options
(a) 1-B, 2-A, 3-D, 4-C (b) 1-D, 2-C, 3-B, 4-A
(c) 1-C, 2-B, 3-A, 4-D (d) 1-A, 2-D, 3-C, 4-B

Ans :

(b) 1-D, 2-C, 3-B, 4-A
Solid particles are tightly packed and vibrate in fixed positions. Liquid particles are loosely packed and can move past each other. Gas particles are far apart and move freely. Dissolving sugar demonstrates the existence of interparticle spaces in liquids.

83. Match the process of changing state with its correct description.

	Column A		**Column B**
1	Melting	A	The rapid conversion of a liquid to a gas throughout the bulk of the liquid at a specific temperature.
2	Boiling	B	The energy (heat) that causes particles to vibrate and move more vigorously.
3	Evaporation	C	The slow conversion of a liquid to a gas that occurs only at the surface and at any temperature.
4	Thermal Energy	D	The process where a solid turns into a liquid upon heating.

Options
(a) 1-C, 2-B, 3-A, 4-D (b) 1-A, 2-D, 3-B, 4-C
(c) 1-D, 2-A, 3-C, 4-B (d) 1-B, 2-C, 3-D, 4-A

Ans :

(c) 1-D, 2-A, 3-C, 4-B
Melting is the transition from solid to liquid. Boiling is the rapid liquid-to-gas conversion at the boiling point. Evaporation is a slower, surface-level conversion. Thermal energy is the heat energy that drives these changes.

84. Match the scientific term with its correct definition or property.

	Column A		**Column B**
1	Compressibility	A	An ancient Indian philosopher who proposed the idea of
2	Melting Point	B	The minimum temperature at which a solid becomes a liquid.
3	Boiling Point	C	The temperature at which a liquid starts to boil and turn into vapour.
4	Acharya Kanad	D	A property of matter, which is very high in gases because of the large spaces between their particles.

Options
(a) 1-D, 2-B, 3-C, 4-A
(b) 1-C, 2-A, 3-B, 4-D
(c) 1-B, 2-D, 3-A, 4-C
(d) 1-A, 2-C, 3-D, 4-B

Ans :

(a) 1-D, 2-B, 3-C, 4-A

Click Here to Buy book on Amazon

particles, allowing the solid to change into a liquid.

133. Explain the relationship between interparticle distance and the strength of interparticle forces.

Ans :

The strength of interparticle attractions depends on the interparticle distance. Even a slight increase in the distance drastically decreases the interparticle attractive forces.

134. Describe the motion of particles within a gas, and explain why it fills any container.

Ans :

Gas particles move freely and rapidly in all directions. With negligible interparticle attractions, they spread out to occupy the entire available space of a container.

135. Why is it incorrect to assume that the spaces between particles in a solid are filled with air?

Ans :

The spaces between particles, or interparticle spaces, are not filled with anything. These spaces are actual voids that contain nothing at all.

136. Predict what would happen to the plunger of a syringe filled with air if you release it after compressing it.

Ans :

Upon release, the gas particles spread out again due to their constant motion. This pushes the plunger back towards its original, extended position.

137. Based on particle arrangement, explain why grinding a piece of chalk is considered a physical change.

Ans :

Grinding chalk is a physical change because it only reduces the size of the chalk specks. It does not alter the constituent particles themselves.

138. Compare the interparticle attraction in liquids to that in solids and gases.

Ans :

Interparticle attractions are strongest in solids, slightly weaker in liquids, and weakest or negligible in gases, which dictates their respective physical properties.

139. Why is a physical change like breaking chalk different from a process like dissolving sugar?

Ans :

Breaking chalk only reduces the size of chalk specks. Dissolving sugar involves the separation of sugar into its constituent particles which then mix with water particles.

NODIA

SHORT ANSWER QUESTIONS

140. Describe the characteristics of constituent particles in the solid state of matter.

Ans :

The key characteristics of particles in the solid state are:

- **Packing** : Particles are very tightly and closely packed together, resulting in minimum interparticle spacing.
- **Attraction** : Interparticle forces of attraction are very strong, holding the particles firmly in fixed positions.
- **Movement** : The movement of particles is negligible; they can only vibrate or oscillate about their fixed positions.

141. Explain why liquids have a fixed volume but not a fixed shape, referring to particle behaviour.

Ans :

In the liquid state, interparticle attractions are slightly weaker than in solids but strong enough to keep the particles close together. This proximity ensures that liquids maintain a fixed volume. However, the forces are not strong enough to hold particles in fixed positions, allowing them to move freely past each other, which is why liquids take the shape of their container.

142. The table below shows the melting points of three different solids. Based on this data, arrange the substances in increasing order of their interparticle forces of attraction and provide a reason for your arrangement.

S.No.	Material	Melting Point
1.	Ice	0°C
2.	Urea	133°C
3.	Iron	1538°C

The particles of liquids and gases are constantly moving, which explains why substances like fragrances or colors spread out through them.

96. Adding heat to a substance causes the movement of its particles to slow down.

Ans :

False
The movement of particles increases when heat is provided; for example, particles move faster in hot water than in cold water.

97. Evaporation is a process where a liquid turns into vapor only when it reaches its boiling point.

Ans :

False Vapour formation occurs at all temperatures below the boiling point. This slower process, which happens only at the surface, is called evaporation.

98. Both liquids and gases are classified as fluids because they have the ability to flow.

Ans :

True
Liquids and gases are known as fluids because they can flow and do not retain a fixed shape, distinguishing them from solids.

99. Grinding a piece of chalk into a fine powder is a chemical change because the substance changes its identity.

Ans :

False
Grinding chalk is a physical change; only the size of the chalk specks is reduced, but the chalk does not change into a new substance.

VERY SHORT QUESTIONS

100. What are the basic units that make up a larger piece of any substance or material called?

Ans :

The basic units that constitute a larger piece of a substance are called constituent particles. These are the smallest units of that substance.

101. According to Acharya Kanad, what ancient Indian term describes the smallest, indivisible particles of matter?

Ans :

Acharya Kanad, an ancient Indian philosopher, spoke about the idea of a Parmanu. He believed matter consists of these tiny, indivisible particles.

102. What happens to sugar's constituent particles when sugar dissolves completely in water?

Ans :

When sugar dissolves in water, it breaks up into its constituent particles which are too small to be seen and cannot be broken down further.

103. Why does matter appear continuous to us even though it is composed of extremely small particles?

Ans :

Matter is composed of a large number of extremely small particles. These particles are so small they cannot be seen even with an ordinary microscope.

104. What are the spaces between the constituent particles of a substance known as?

Ans :

The tiny sugar particles occupy the available spaces between the water particles. These spaces between particles are known as interparticle spaces.

105. What force holds the constituent particles of matter together, giving substances their physical state?

Ans :

The constituent particles of matter are held together by attractive forces called interparticle attractions. The strength of these forces determines the physical state.

106. Why do solid objects like an iron nail or a wooden block have a definite shape and volume?

Ans :

Solids have a definite shape and volume because their particles are tightly packed, and the interparticle attractions are very strong, holding them in fixed positions.

107. What is the term for the minimum temperature at which a solid melts into a liquid?

Ans :

The minimum temperature at which a solid melts to become a liquid at atmospheric pressure

NODIA

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

is called its melting point, which weakens interparticle forces.

108. How does heating a solid affect the movement of its constituent particles?

Ans :

When solids are heated, their particles gain energy and vibrate more vigorously. This increased movement can weaken the interparticle forces of attraction.

109. Why do liquids, such as water, take the shape of the container they are placed in?

Ans :

Liquids do not have a fixed shape because their particles are free to move around, allowing them to take the shape of any container.

110. What is the term for the temperature at which a liquid boils and turns into vapour?

Ans :

The temperature at which a liquid boils and rapidly turns into a vapour at atmospheric pressure is known as its boiling point.

111. What distinguishes the process of evaporation from boiling in terms of where it occurs?

Ans :

Evaporation is a slow process of vapour formation that occurs only at the surface of a liquid, happening at all temperatures below boiling point.

112. Why do gases lack both a fixed shape and a fixed volume?

Ans :

Gases have no fixed shape or volume because their particles have negligible interparticle attractions, allowing them to move freely and occupy any available space.

113. What term is used to collectively classify liquids and gases based on their ability to flow?

Ans :

Both liquids and gases are classified as fluids. This is because they can flow and do not retain a fixed shape like solids.

114. What happens to the volume of air inside a syringe when the plunger is pushed inward?

Ans :

When you compress the air inside a syringe by pushing the plunger, the volume of the air decreases as the gas particles are forced closer together.

115. When sugar is added to water, why does the final volume seem less than expected?

Ans :

The final volume is less than the sum of the volumes of water and sugar because the sugar particles occupy the interparticle spaces between water particles.

116. What can be observed when potassium permanganate is added to a glass of still water?

Ans :

When potassium permanganate is added to still water, you will initially see pink streaks spreading out, eventually colouring the entire bulk of water uniformly.

117. How does increasing the temperature of water affect the speed at which potassium permanganate spreads?

Ans :

Increasing water temperature causes particles to move faster. Therefore, potassium permanganate spreads fastest in hot water and slowest in ice-cold water.

118. Why does the fragrance of a burning incense stick eventually spread throughout an entire room?

Ans :

The fragrance spreads because particles of air are in constant motion. They hit the fragrance particles and help them to spread throughout the room.

119. What determines the physical state of matter by influencing interparticle forces and distances?

Ans :

The thermal energy of the particles is the key factor that determines the physical state of matter by affecting the distance between particles.

120. Compare the final result of grinding chalk with dissolving sugar in water. What is the key difference?

Ans :

Downloaded from www.pdf.tube

Grinding chalk is a physical change reducing particle size. Dissolving sugar involves breaking it down to its constituent particles that occupy interparticle spaces in water.

121. Explain why it is possible to move your finger through water but not through a solid block of wood.

Ans :

Water particles are held by weaker interparticle forces than wood, allowing them to be displaced. In solids, strong forces hold particles in fixed positions.

122. Why does heating a solid eventually cause it to melt into a liquid?

Ans :

Heating increases particle vibration. At the melting point, vibrations become so strong that particles overcome attractive forces and move apart, forming a liquid.

123. How does the compressibility of gases in a syringe demonstrate the concept of interparticle spacing?

Ans :

Gases are highly compressible because their particles have large interparticle spaces. Applying pressure easily reduces this space, decreasing the volume of the gas.

124. If you mix sand in water, will the final volume of the mixture increase? Explain why.

Ans :

Yes, the volume will increase. Sand is insoluble, so its particles do not occupy interparticle spaces. Instead, they settle and displace water, increasing total volume.

125. Contrast the movement of particles in solids with the movement of particles in liquids.

Ans :

Solid particles are restricted to vibrating about fixed positions due to strong forces. Liquid particles can move freely past each other within a limited space.

126. Why does a solid like iron have a much higher melting point than a solid like ice?

Ans :

Iron has very strong interparticle forces of attraction requiring a high temperature to overcome them, whereas ice has weaker forces, resulting in a lower melting point.

127. Explain why a liquid has a definite volume, unlike a gas, based on interparticle forces.

Ans :

In liquids, interparticle attractions are strong enough to keep particles close together, maintaining a fixed volume. Gases have negligible attractions, allowing expansion.

128. Based on particle theory, why do soluble solids like salt dissolve in water while insoluble solids like sand do not?

Ans :

Soluble solids dissolve because water particles can pull out their constituent particles. Insoluble solids have stronger interparticle forces that water particles cannot overcome.

129. How does the constant motion of water particles explain the dissolution of potassium permanganate?

Ans :

Constantly moving water particles first pull out the particles of potassium permanganate and then hit them, causing them to spread throughout the entire liquid.

130. Why can't constituent particles be broken down further, even by continuous grinding?

Ans :

Constituent particles are the basic building blocks of a substance. By definition, they are the smallest units that cannot be physically broken down any further.

131. Differentiate between the terms "particle" and "constituent particle" in a scientific context.

Ans :

The term "particle" can refer to larger units like dust specks, while "constituent particle" specifically refers to the basic, indivisible building blocks of matter.

132. How does thermal energy influence the state of matter from solid to liquid?

Ans :

At the melting point, added thermal energy is used to overcome the attractive forces between

NODIA

65. The minimum temperature at which a liquid boils and turns into vapor at atmospheric pressure is its _____.
(A) Boiling point
(B) Freezing point
(C) Melting point
(D) Dew point

Ans :

(A) Boiling point
The boiling point is a characteristic property of a liquid. It is the specific temperature at which the liquid's vapor pressure equals the surrounding atmospheric pressure, allowing rapid vaporization to occur throughout the liquid's volume.

66. In which state of matter is the movement of particles described as 'negligible (only vibrations)'?
(A) Liquid
(B) Solid
(C) Gas
(D) Fluid

Ans :

(B) Solid
In the solid state, particles are held so tightly by strong interparticle attractions that they cannot move from their positions in the crystal lattice. Their only motion is to vibrate or oscillate about these fixed points.

67. If you have two solids, A and B, and solid A has a much higher melting point than solid B, what can you infer about their interparticle forces?
(A) Solid A has much weaker interparticle forces than solid B.
(B) Both solid A and solid B have equal interparticle forces.
(C) Solid A has stronger interparticle forces than solid B.
(D) The melting point is not related to the interparticle forces.

Ans :

(C) Solid A has stronger interparticle forces than solid B.
A higher melting point means that more energy (a higher temperature) is required to break the forces holding the particles in their fixed positions. This indicates that the interparticle forces of attraction in solid A are stronger than those in solid B.

68. The constant, random motion of tiny smoke particles suspended in the air (Brownian motion) is caused by _____.
(A) The smoke particles constantly and randomly hitting each other
(B) The smoke particles being alive and moving around on their own
(C) The downward force of gravity pulling on the smoke particles
(D) Invisible air particles constantly hitting the smoke particles

Ans :

(D) invisible air particles constantly hitting the smoke particles
The smoke particles are large enough to be seen, but they are constantly being bombarded by the much smaller, faster-moving, and invisible particles of air. These random collisions cause the smoke particles to jiggle and move erratically.

69. Which of the following is NOT a property of solids?
(A) High compressibility
(B) Definite shape
(C) Definite volume
(D) Strong interparticle attractions

Ans :

(A) High compressibility
Solids are characterized by low compressibility. Their particles are already packed very closely together, with minimal interparticle space, so it is very difficult to squeeze them into a smaller volume. High compressibility is a property of gases.

70. Spreading of an incense stick's fragrance is to gas particles as spreading of potassium permanganate's color is to _____ particles.
(A) Solid
(B) Liquid
(C) Gas
(D) Stationary

Ans :

(B) Liquid
The analogy compares the demonstration of particle motion in two different states. The incense stick fragrance demonstrates the motion of particles in a gas (air). The potassium permanganate crystal demonstrates the motion of particles in a liquid (water).

Download INDIA's Best Study app NODIA

Click Here to Buy book on Amazon

Ans :

The increasing order of interparticle attraction is Ice < Urea < Iron. A higher melting point indicates that more heat energy is needed to overcome the forces holding the particles together. Therefore, iron has the strongest interparticle forces, and ice has the weakest among the three.

143. What are the defining properties of matter in the gaseous state regarding its particles?

Ans :

The defining properties related to particles in the gaseous state include:

- **Spacing** : The interparticle spacing is at its maximum because particles are far apart from each other.
- **Attraction** : Interparticle attractions are negligible, meaning the forces holding particles together are extremely weak.
- **Movement** : Particles are completely free and move constantly in all available space, which is why gases fill their containers.

144. Describe the process of a solid melting into a liquid by explaining the changes at the particle level.

Ans :

When a solid is heated, its particles gain thermal energy and begin to vibrate more vigorously. At the melting point, the vibrations become so intense that the particles start to overcome the strong interparticle forces of attraction holding them in fixed positions. Consequently, the particles begin to move apart and slide past one another, transforming the substance from a solid into a liquid.

145. Explain the process that occurs when a liquid is heated to its boiling point.

Ans :

When a liquid is heated, its particles gain energy and move more vigorously. At the boiling point, this movement becomes so energetic that the particles can completely overcome the interparticle forces of attraction. This allows them to escape from the liquid state and form vapour, not just at the surface but throughout the liquid, which is observed as the formation of bubbles.

146. Compare the interparticle spacing across solids, liquids, and gases.

Ans :

The interparticle spacing varies significantly across the three states of matter.

- **Solids** : Particles are closely packed together, resulting in minimum interparticle spacing.
- **Liquids** : Particles are slightly farther apart than in solids, having a little more interparticle space.
- **Gases** : Particles are very far from each other, leading to maximum interparticle spacing.

147. How does the experiment of dissolving potassium permanganate in water demonstrate the constant motion of particles?

Ans :

When potassium permanganate is added to water, the water particles, which are in constant motion, collide with it. They pull out the permanganate particles from the grain and then continue to hit these particles, causing them to spread throughout the liquid. This gradual, uniform colouring of the water, even without stirring, provides clear evidence that the particles of the liquid are always moving.

148. How does thermal energy dictate the differences between the solid, liquid, and gaseous states?

Ans :

Thermal energy determines the physical state by influencing particle movement and interparticle forces.

- **Solids** : Particles have low thermal energy, so they remain close with strong attractive forces, only vibrating in place.
- **Liquids** : Increased thermal energy allows particles to overcome some attraction, enabling them to move around within a limited space.
- **Gases** : With high thermal energy, particles overcome all attractive forces and move freely in all directions.

149. What did Acharya Kanad propose about the nature of matter in his ancient text, Vaisheshika Sutras?

Ans :

In his work, the Vaisheshika Sutras, the ancient Indian philosopher Acharya Kanad introduced a foundational idea about the nature of matter. He believed that all matter is composed of tiny, eternal, and indivisible particles. He named these fundamental particles 'Parmanu', which is conceptually similar to the modern idea of an atom, showing that the particulate nature of matter has been a subject of thought for centuries.

NODIA

150. Explain why compressing a gas is possible but compressing a liquid like water is practically impossible.

Ans :

Gases are easily compressible because their constituent particles are very far apart, with large interparticle spaces between them. Applying external pressure forces these particles closer together, reducing the volume. In contrast, the particles in liquids are already packed closely together with very little interparticle space, making them practically incompressible, as there is minimal room to reduce their volume further through pressure.

151. How does the experiment involving dissolving salt or sugar in water support the idea that matter has interparticle spaces?

Ans :

When a soluble solid like sugar is added to water and dissolves, the final volume of the solution is less than the combined volumes of the individual components. This observation indicates that there must be empty spaces between the water particles. The constituent particles of the dissolved sugar occupy these interparticle spaces, which is why the overall volume does not increase as much as expected.

152. A student observes the time it takes for a crystal of potassium permanganate to spread in water at different temperatures, as recorded in the table. Explain these observations based on the movement of particles.

Tumbler	**Water Temperature**	**Time Taken for Colour to Spread Uniformly**
A	Ice-cold	15 minutes
B	Room Temperature	5 minutes
C	Hot	2 minutes

Ans :

The particles in hot water have the highest kinetic energy, causing them to move faster. This rapid movement helps spread the potassium permanganate particles more quickly. In contrast, the particles in ice-cold water move the slowest, resulting in the slowest diffusion of colour.

153. Contrast the process of boiling with evaporation based on temperature and location of vapour formation.

Ans :

The primary differences between boiling and evaporation are:

- **Temperature** : Boiling occurs at a specific temperature known as the boiling point, while evaporation can happen at any temperature below the boiling point.
- **Location** : Boiling is a rapid process where vapour forms throughout the entire bulk of the liquid, whereas evaporation is a slower process that occurs only at the surface of the liquid.

154. Describe how soap particles help in cleaning clothes stained with oil, based on their particulate nature.

Ans :

The particulate nature of matter is crucial for cleaning. When washing oily clothes, countless soap particles surround the oil particles on the fabric. One end of each soap particle attaches to an oil particle, while the other end mixes with the water. This unique interaction allows the soap particles to effectively lift the oil off the fabric and wash it away with the water.

155. The table compares the properties of solids, liquids, and gases. Using the information on interparticle spacing and attraction, explain why gases can be easily compressed but solids cannot.

Property	**Solid**	**Liquid**	**Gas**
Interparticle spacing	Minimum	Little more than solids	Maximum
Interparticle attraction	Maximum	Weaker than solids	Minimum (negligible)

Ans :

Gases have large interparticle spaces and negligible forces of attraction between particles. This allows the particles to be forced closer together when external pressure is applied. In solids, particles are tightly packed with very little space between them, making them incompressible.

156. Explain why the smell of hot food reaches you from a distance but you have to go close to smell cold food.

Ans :

Downloaded from www.pdf.tube

This phenomenon is due to the effect of temperature on particle movement. The particles of fragrance from hot food have higher thermal energy, causing them to move much faster. These fast-moving fragrance particles mix with the constantly moving air particles and spread quickly through the room. In contrast, particles from cold food have less energy, move slower, and do not spread as far or as fast.

157. Why are solids generally denser than liquids, with ice being a notable exception?

Ans :

In most substances, particles in the solid state are more tightly and closely packed than in the liquid state, meaning more mass is contained in a given volume. This results in solids being denser. However, water is an exception. When water freezes into ice, its particles arrange into a structure that takes up more space, increasing its volume and thus decreasing its density, allowing ice to float.

158. Describe the level of interparticle attraction in each of the three states of matter.

Ans :

The interparticle attraction differs significantly across the states of matter.

- **Solids** : The attraction is at its maximum, holding particles in fixed, closely packed positions.
- **Liquids** : The attraction is slightly weaker than in solids, allowing particles to move but keeping them relatively close.
- **Gases** : The attraction is minimum or negligible, enabling particles to move freely and independently of one another.

159. Explain what happens at the particle level when a liquid turns into a gas.

Ans :

When a liquid is heated to its boiling point, its particles absorb enough thermal energy to move very vigorously. This energetic movement allows them to completely overcome the interparticle forces of attraction that hold them together in the liquid state. As a result, the particles can escape from the liquid and move far apart from each other, transforming the substance into the gaseous state, or vapour.

160. How is the constant motion of particles related to the phenomenon of diffusion, as seen with an incense stick?

Ans :

The constant, random motion of particles is the driving force behind diffusion. When an incense stick is lit, its fragrance particles are released into the air. The air particles, which are also in continuous motion, collide with these fragrance particles. These collisions help push and spread the fragrance particles from an area of high concentration to the rest of the room, eventually distributing them evenly.

161. Why is it said that matter is not continuous but particulate in nature? Use an example to support your answer.

NODIA

Ans :

The idea that matter is particulate means it is made of tiny, individual particles rather than being a continuous substance. The dissolution of sugar in water provides strong evidence for this. If water were continuous, there would be no empty spaces for the sugar to go. Since sugar disappears without significantly increasing the volume, it must be breaking down into tiny particles that fit into the spaces between water particles.

162. Explain why a pile of sand can be formed, but a pile of water cannot.

Ans :

This difference is due to the interparticle forces in solids versus liquids. In sand, which is a solid, the particles are held together by strong attractive forces that keep them in fixed positions relative to each other, allowing them to stack. In water, a liquid, the interparticle forces are weaker, allowing particles to slide past one another and flow, preventing the formation of a stable pile.

163. What are the three key characteristics used to differentiate the states of matter based on their particles?

Ans :

The three states of matter can be differentiated by the following particulate characteristics:

- **Interparticle Spacing** : The distance between particles, which is minimum in solids and maximum in gases.

Download INDIA's Best Study app NODIA

- **Liquid to Gas (Boiling)** : Further heating increases the kinetic energy of liquid particles. At the boiling point, particles move so fast that they completely overcome the remaining attractive forces, escaping the liquid to become a gas with much greater separation and freedom of movement.

177. Using two different experiments from the chapter, provide evidence supporting the particulate nature of matter.

Ans :

Two key experiments provide strong evidence for the particulate nature of matter.

- **Dissolving Sugar in Water** : When sugar dissolves, it seems to vanish, and the final volume is less than the sum of the initial volumes of sugar and water. This indicates that matter is not continuous. Instead, sugar breaks into tiny constituent particles that fit into the pre-existing empty spaces (interparticle spaces) between the water particles.
- **Diffusion of Potassium Permanganate** : When a crystal of potassium permanganate is placed in still water, colour gradually spreads without stirring. This happens because water particles are in constant motion, colliding with and dispersing the permanganate particles, demonstrating that both substances are made of moving particles.

178. Explain in detail why liquids have a definite volume but no fixed shape, while gases have neither.

Ans :

The properties of liquids and gases are determined by the balance between interparticle attraction and particle movement.

- **Liquids** : In a liquid, the interparticle forces are strong enough to keep the particles close to each other, preventing them from spreading far apart. This is why a liquid maintains a definite volume. However, the forces are not strong enough to lock particles into fixed positions, so they can slide past one another, allowing the liquid to flow and take the shape of its container.
- **Gases** : In a gas, the interparticle forces of attraction are negligible. The particles have high kinetic energy and move freely and randomly, spreading out to fill the entire volume of any container they are placed in. This results in gases having neither a fixed shape nor a fixed volume.

179. Describe how temperature influences the movement of particles and the rate of diffusion in liquids.

Ans :

Temperature has a direct and significant impact on particle motion and diffusion, which can be observed experimentally.

- **Particle Movement** : An increase in temperature provides more thermal energy to the particles of a liquid. This increased energy translates into greater kinetic energy, causing the particles to move faster and more vigorously.
- **Rate of Diffusion** : As seen with potassium permanganate, this faster particle movement accelerates diffusion. The rapidly moving water particles collide more frequently and with greater force with the solute particles, causing them to spread throughout the solvent much more quickly in hot water compared to cold water.

180. What is interparticle spacing, and how does it explain the different compressibility of solids, liquids, and gases?

Ans :

Interparticle spacing refers to the empty space or distance between the constituent particles of a substance.

- **Gases** : Gases have the largest interparticle spacing. This vast empty space allows their particles to be easily pushed closer together when external pressure is applied, making them highly compressible.
- **Liquids** : Liquids have very little interparticle space as their particles are already quite close. This makes them practically incompressible, as there is almost no room to reduce their volume further.
- **Solids** : Solids have the minimum interparticle spacing. Their particles are tightly packed, leaving no significant voids for compression. Therefore, solids are considered incompressible for all practical purposes.

181. Explain the scientific concept of "interparticle attractions" and their role in defining the properties of solids.

Click Here to Buy book on Amazon

In liquids, the interparticle attractions are weaker than in solids, and the particles are not in fixed positions. This allows the particles to slide past one another, enabling the liquid to flow and take the shape of its container. Solids have particles fixed in a rigid structure.

171. Explain the role of interparticle attractions in giving solids their rigid structure.

Ans :

In solids, the interparticle attractions are the strongest among the three states of matter. These powerful forces pull the constituent particles into a tightly packed arrangement, locking them into fixed positions. This fixed arrangement prevents the particles from moving freely past one another and is responsible for the definite shape and rigidity characteristic of solid substances, allowing them to resist changes in shape.

172. Why does the rate of diffusion increase with temperature, as seen with potassium permanganate in water?

Ans :

The rate of diffusion is directly related to the kinetic energy of particles, which is determined by temperature.

- **Higher Temperature** : At higher temperatures, water particles possess more kinetic energy and move much faster.
- **Increased Collisions** : This rapid movement leads to more frequent and energetic collisions with the potassium permanganate particles, causing them to spread more quickly.

173. How does the particulate model explain why a balloon expands when you inflate it with air?

Ans :

When air is blown into a balloon, a massive number of gas particles are forced inside. These particles are in constant, random motion and collide with the inner walls of the balloon. The collective force of these countless collisions exerts an outward pressure. As more air is added, the number and force of collisions increase, pushing the flexible walls of the balloon outward and causing it to expand.

174. What is the difference between the particles of a substance (e.g., chalk) and its constituent particles?

Ans :

The difference lies in the level of subdivision.

- **Particles of a substance** : This term can refer to visible or microscopic specks, such as grains of chalk powder, which are still made of the same substance.
- **Constituent Particles** : This term refers to the fundamental, basic building blocks of that substance (like atoms or molecules) that cannot be broken down further by physical means.

LONG ANSWER QUESTIONS

175. Compare and contrast the three states of matter—solid, liquid, and gas—based on their particulate nature.

Ans :

The three states of matter are distinguished by the arrangement and behavior of their constituent particles.

- **Solids** : Particles are tightly packed in fixed positions with minimum interparticle spacing. They are held by the strongest interparticle attractions, limiting their movement to only vibrations.
- **Liquids** : Particles are less tightly packed than in solids, with slightly more interparticle space. The interparticle forces are weaker, allowing particles to move past each other, giving liquids their fluidity.
- **Gases** : Particles are very far apart with maximum interparticle spacing. The attractive forces are negligible, allowing particles to move freely and randomly in all directions.

176. Describe the transition of a substance from a solid to a liquid and then to a gas, explaining the changes in particle energy and forces.

Ans :

The transition between states is driven by changes in the thermal energy of the particles.

- **Solid to Liquid (Melting)** : As a solid is heated, its particles gain thermal energy and vibrate more vigorously. At the melting point, they gain enough energy to overcome the strong interparticle forces holding them in a fixed lattice, allowing them to move more freely as a liquid.

Downloaded from www.pdf.tube

Questions:

1. What two properties of gases are demonstrated in this experiment?
2. Why does the smoke occupy the entire available space of both jars?
3. What can be inferred about the interparticle attractions in gases from this observation?

Ans :

1. The experiment demonstrates that gases have no fixed shape and no fixed volume.
2. Smoke occupies the entire space because the particles in gases move freely in all directions with negligible interparticle attractions.
3. It can be inferred that the interparticle attractions in gases are negligible, allowing the particles to move far apart from each other.

194. A student breaks a stick of chalk into smaller pieces and then grinds them into a fine powder. She observes the powder with a magnifying glass and sees tiny grains. Her teacher explains that even these tiny grains are made up of millions of smaller, invisible constituent particles, and grinding the chalk is a physical change, not a chemical one.

Questions:

1. What are the basic building blocks that make up a larger piece of a substance called?
2. Is grinding chalk a physical or chemical change? Why?
3. If the process of grinding could continue indefinitely, what would be the smallest unit of chalk that could be reached?

Ans :

1. They are called constituent particles.
2. It is a physical change because the chalk does not change into a new substance; only the size of its pieces is reduced.
3. Eventually, one would reach a stage where the chalk particles (the constituent particles) cannot be broken down any further.

195. The book classifies both liquids and gases as fluids. This is because both states of matter have the ability to flow and do not retain a fixed shape, unlike solids. This common property is due to the fact that the particles in both liquids and gases are not held in fixed positions and can move past one another.

Questions:

1. Which two states of matter are classified as fluids?
2. What property do liquids and gases share that allows them to be classified as fluids?
3. Based on the particle model, why are solids not classified as fluids?

Ans :

1. Liquids and gases are classified as fluids.
2. They share the property of being able to flow and not retaining a fixed shape.
3. Solids are not fluids because their particles are held in fixed positions by strong interparticle forces and cannot move freely past one another.

196. A student carefully measures 100 mL of water. She then adds 2 teaspoons of salt and stirs until it is completely dissolved. After dissolution, she observes that the final volume of the solution is only slightly more than 100 mL, not the full combined volume of the water and the salt. This indicates that the salt particles have occupied the existing spaces between the water particles.

Questions:

1. What happens to the particles of a dissolved substance in a solution?
2. What does this experiment demonstrate about the arrangement of particles in a liquid?
3. What would happen to the total volume if the student added sand (an insoluble solid) to the water instead of salt?

Ans :

1. The particles of the dissolved substance occupy the interparticle spaces between the solvent particles.
2. It demonstrates that there is some space between the particles of a liquid (water).
3. Since sand does not dissolve, its particles would settle at the bottom and occupy their own space, causing the total volume to increase significantly.

197. A student finds it very easy to pass his hand through the air. It is also possible, with some resistance, to move his finger through water in a bucket. However, it is impossible for him to pass his hand through a solid wooden block. This experience demonstrates the difference in the strength of interparticle forces of attraction between the three states of matter.

Questions:

1. What are the forces that hold the constituent particles of matter together called?
2. In which state of matter are the interparticle attractions the strongest?

NODIA

Ans :

Interparticle attractions are the forces that hold the constituent particles of matter together. The strength of these forces is fundamental in determining a substance's physical state.

- **Role in Solids** : In solids, these attractive forces are at their maximum strength. They are powerful enough to pull particles into a tight, ordered arrangement and lock them into fixed positions. This strong binding is what gives solids their key properties : a definite shape, a definite volume, and rigidity, as the particles cannot move freely past one another.

182. Discuss the difference between boiling and evaporation at the particle level, including the energy requirements for each process.

Ans :

Both boiling and evaporation involve a liquid turning into a gas, but they differ significantly in mechanism and energy.

- **Evaporation** : This is a surface phenomenon occurring at any temperature. Only the particles at the surface with enough kinetic energy to overcome the surface-level attractive forces can escape into the air. It is a slow and gradual process.
- **Boiling** : This is a bulk phenomenon that occurs at a specific temperature (the boiling point). At this temperature, all particles throughout the liquid gain sufficient energy to overcome the interparticle forces and turn into vapour. This rapid conversion is seen as bubble formation within the liquid.

183. Explain why the fragrance of an unlit incense stick can only be smelled up close, but a lit one can be smelled across a room.

Ans :

This difference is explained by the rate of diffusion, which is influenced by temperature and the state of matter.

- **Unlit Stick** : An unlit incense stick is a solid. The fragrance particles escape very slowly from its surface into the air through sublimation or slow evaporation. The concentration of these particles in the air remains low and close to the stick.
- **Lit Stick** : Burning the stick provides significant thermal energy. This energy causes the solid components to rapidly turn into gaseous particles (smoke and fragrance) which have high kinetic energy. These fast-moving particles then quickly mix and spread throughout the room via diffusion, aided by the constant motion of air particles.

Download INDIA's Best Study app NODIA

184. How does the dissolution of sugar in water provide evidence for both the particulate nature of matter and the existence of interparticle spaces?

Ans :

The simple act of dissolving sugar in water demonstrates two fundamental concepts of matter.

- **Particulate Nature** : The fact that a solid sugar crystal can break down and spread evenly throughout the water shows it is not a continuous substance but is composed of countless tiny, individual particles. If it were continuous, it could not disperse in this way.
- **Interparticle Spaces** : After the sugar dissolves, the total volume of the solution is not significantly larger than the initial volume of the water. This implies the sugar particles did not simply add to the volume but instead moved into pre-existing empty spaces between the water particles, confirming that such spaces exist.

CASE BASED QUESTIONS

185. A student adds a teaspoon of sugar to a glass of water and stirs. The sugar crystals disappear, but the water tastes sweet. This happens because the sugar breaks down into its constituent particles, which are too small to be seen. These tiny sugar particles then spread out and occupy the interparticle spaces that exist between the water particles, creating a uniform solution.

Questions:

1. What are the spaces between the particles of a substance called?
2. Based on the particulate nature of matter, explain why the sugar seems to disappear when stirred in water.
3. What does the fact that the entire glass of water tastes sweet prove about the sugar particles?

Click Here to Buy book on Amazon

- **Interparticle Attraction** : The strength of the forces holding particles together, which is maximum in solids and negligible in gases.
- **Movement of Particles** : The degree of freedom particles have, from only vibrating in solids to moving freely in gases.

164. Describe what happens when you attempt to dissolve an insoluble substance like sand in water.

Ans :

When an insoluble substance like sand is added to water, it does not dissolve because the interparticle forces holding the sand particles together are too strong for the water particles to overcome and pull them apart. Instead of dispersing into the interparticle spaces of the water, the sand particles simply settle down at the bottom of the container, occupying space and increasing the total volume.

165. The table shows the results of an experiment where different substances were added to 100 mL of water. Explain why the final volume is different for sugar and sand.

Substance Added	Soluble/ Insoluble	Final Volume of Mixture
2 tsp sugar	Soluble	100 mL
2 tsp sand	Insoluble	105 mL

Ans :

Sugar is soluble, and its particles occupy the interparticle spaces between the water molecules, so the volume does not increase. Sand is insoluble; its particles do not fit into the spaces between water molecules and instead displace the water, causing the total volume to increase.

166. Why is thermal energy a critical factor in determining the physical state of a substance?

Ans :

Thermal energy is critical because it directly relates to the kinetic energy and movement of a substance's constituent particles. Low thermal energy, as in solids, means particles have little movement and strong attractions. As thermal energy increases, particles move more vigorously, overcoming these attractions to transition first to a liquid and then to a gaseous state where movement is greatest and attractions are negligible.

167. Based on particle theory, why can a gas be easily compressed while a solid cannot?

Ans :

The compressibility of a substance is determined by the spacing between its particles.

- **Gases** : Have very large interparticle spaces, so applying pressure can easily force the particles closer together, reducing the volume.
- **Solids** : Have particles that are already tightly packed with minimal interparticle space, leaving virtually no room for compression.

168. How does the process of washing clothes with soap illustrate the particulate nature of matter?

Ans :

Washing with soap is a practical example of the particulate nature of matter. Numerous tiny soap particles interact with the oil particles on the fabric. One part of the soap particle attaches to the oil, and the other part attaches to the water. This allows the soap to act as a bridge, lifting the oil away from the clothes and into the water, a process only possible because matter exists as discrete particles.

169. If both liquids and gases are fluids, what is the key difference between them at a particle level?

Ans :

While both are fluids, the key difference lies in their interparticle forces and spacing. In liquids, the particles are still held closely together by moderate attractive forces, giving them a fixed volume. In gases, the particles are far apart with negligible attractive forces, allowing them to expand indefinitely and not have a fixed volume, a property liquids do not share.

NODIA

170. Analyse the properties of the three states of matter given in the table. Explain why a liquid can flow and take the shape of its container, while a solid maintains a fixed shape.

Property	Solid	Liquid
Particle Packing	Closely packed	Loosely packed
Particle Movement	Vibrate in fixed positions	Can move past one another
Interparticle Attraction	Maximum	Weaker than solids

Ans :

3. Predict what would happen if the student did not stir the water in either beaker. Would the color still spread? Why?

Ans :

1. It demonstrates that the particles of matter are in constant motion.
2. The experiment shows that the movement of particles increases when heat is provided; particles move faster in hot water than in cold water.
3. Yes, the color would still spread, though more slowly. The spreading is caused by the constant, random motion of the water particles hitting the permanganate particles, a process which happens naturally even without stirring.

190. A student examines several solid objects : an iron nail, a stone, and a wooden block. She notices that all of them have a definite shape and volume. This is because, in solids, the constituent particles are tightly packed with very strong interparticle attractions. These strong forces hold the particles in fixed positions, preventing them from moving freely past each other.

Questions:

1. What are the two defining properties of solids mentioned in the case study?
2. How does the strength of interparticle attractions in solids affect the movement of their particles?
3. If the student hammers the iron nail, its shape might change. Does this mean iron is not a true solid? Explain.

Ans :

1. Solids have a definite shape and volume.
2. The very strong interparticle attractions hold the particles in fixed positions, preventing them from moving freely and allowing them only to vibrate.
3. No, iron is still a solid. While an external force can deform it, it does not flow or change shape on its own. Its particles remain in fixed positions relative to each other.

191. A student pours 200 mL of water from a tall bottle into a wide jug. She observes that the water takes the shape of the jug, but the volume remains 200 mL. This happens because the particles in a liquid are free to move within a limited space but the interparticle attractions are still strong enough to keep them together, giving liquids a fixed volume.

Questions:

1. Do liquids have a fixed shape and a fixed volume?
2. Why does the water take the shape of the jug it is poured into?
3. If you can move your finger through water, what does this suggest about the strength of the interparticle attractions in liquids compared to solids?

Ans :

1. Liquids have a fixed volume but do not have a fixed shape.
2. The water takes the shape of the jug because the particles of liquids are free to move and can slide past each other.
3. It suggests that the interparticle attractions in liquids are weaker than in solids, as you cannot easily move your finger through a solid object like a wooden block.

192. When a pot of water is heated, the particles gain thermal energy and start moving more vigorously. At the boiling point, the movement becomes so energetic that particles throughout the liquid have enough energy to overcome the interparticle forces of attraction. They escape from the liquid state and turn into water vapor, or gas, which is seen as bubble formation.

Questions:

1. What is the temperature at which a liquid boils and turns into vapor called?
2. What happens to the interparticle forces of attraction when a liquid is converted into a gas?
3. Spilled water on a floor disappears over time even without boiling. What is this slower process called and where does it occur?

Ans :

1. It is called its boiling point.
2. The interparticle forces of attraction decrease as the particles move far apart from each other.
3. This slower process is known as evaporation, and it occurs only at the surface of the liquid.

193. A student collects smoke in a gas jar and covers it. He then places another empty gas jar upside down over the first one and removes the cover between them. He observes the smoke spreading out from the bottom jar and completely filling the entire space of both jars. This demonstrates that gases have no fixed shape or volume.

Downloaded from www.pdf.tube

Ans :

1. The spaces between particles are known as interparticle spaces.
2. The sugar breaks up into its constituent particles, which are extremely small and cannot be seen. These particles then occupy the spaces between the water particles.
3. It proves that the constituent particles of sugar have spread out and are evenly distributed throughout the entire volume of water.

186. A student takes a syringe, closes its open end with her thumb, and pushes the plunger. She finds it easy to push the plunger inward, decreasing the volume of the air inside. This shows that the gas particles have large spaces between them. When she tries the same with a syringe filled with water, she finds that water is practically incompressible.

Questions:

1. Why are gases highly compressible?
2. What happens to the interparticle spacing of the air inside the syringe when the plunger is pushed?
3. Based on the particle model of matter, explain why water is practically incompressible compared to air.

Ans :

1. Gases are compressible because the particles have a lot of space between them in their natural state.
2. When the plunger is pushed, the gas particles are forced to come closer, and the interparticle spacing is reduced.
3. In liquids like water, the particles are already packed more closely together with much less interparticle space compared to gases; therefore, they cannot be easily compressed further.

187. A person lights an incense stick in one corner of a room. Initially, the fragrance is only felt near the stick. After a few minutes, the fragrance spreads and can be smelled throughout the entire room. This happens because the fragrant particles from the incense mix with the constantly moving air particles, which help them spread everywhere.

Questions:

1. What property of gas particles allows the fragrance to fill the entire room?
2. How do the particles of air in the room help the fragrance to spread?
3. If the room were very cold, would the fragrance spread faster or slower? Explain your reasoning.

Ans :

1. Gas particles move freely in all directions and tend to occupy the entire available space.
2. The constantly moving air particles hit the particles of the fragrance and help them spread throughout the room.
3. It would spread slower. The movement of particles increases when heat is provided. In a cold room, the air particles would move slower, thus spreading the fragrance particles less quickly.

188. An ice cube (solid water) is taken out of a freezer. As it absorbs heat, its particles begin to vibrate more vigorously. At its melting point, the particles have enough energy to overcome the strong interparticle forces holding them in fixed positions. The solid ice then transforms into liquid water, which can flow and take the shape of its container.

Questions:

1. What is the temperature at which a solid melts to become a liquid called?
2. Describe the change in the motion of water particles as ice melts into liquid.
3. Why does solid ice have a definite shape while liquid water does not?

Ans :

1. This temperature is called its melting point.
2. In the solid state, particles only vibrate about their fixed positions. As it melts, the vibrations become so vigorous that particles start leaving their positions and moving past each other.
3. In solid ice, strong interparticle attractions hold the particles in fixed positions, giving it a definite shape. In liquid water, these forces are weaker, allowing particles to move freely and take the shape of the container.

189. A student drops a few grains of potassium permanganate into a beaker of hot water and another into a beaker of ice-cold water. She observes that the pink color spreads much faster throughout the hot water. This demonstrates that the water particles in the hot water are in more rapid and constant motion, spreading the permanganate particles more quickly.

Questions:

1. What property of matter's particles is demonstrated by the spreading of the pink color?
2. What does this experiment show about the effect of temperature on the movement of particles?

NODIA

3. Arrange the three substances—air, water, and wood—in order of increasing strength of their interparticle attractions.

Ans :

1. They are called interparticle attractions.
2. Interparticle attractions are strongest in the solid state.
3. The order of increasing strength of interparticle attractions is : air (gas) < water (liquid) < wood (solid).

Download INDIA's Best Study app NODIA

198. A student observes that when a solid is heated, its particles vibrate more vigorously. If enough heat is supplied to reach the melting point, the solid turns into a liquid. If the liquid is heated further to its boiling point, it turns into a gas. This shows that adding thermal energy increases the movement of particles and weakens the interparticle attractions.

Questions:

1. What happens to the motion of particles in a solid when it is heated?
2. How does thermal (heat) energy affect the physical state of matter?
3. Why does a gas expand to fill any container, while a solid does not? Relate your answer to thermal energy and interparticle forces.

Ans :

1. When a solid is heated, its particles vibrate more vigorously.
2. Thermal energy determines the physical state of matter. Adding heat increases particle motion, which can overcome interparticle forces, causing a change of state from solid to liquid, or liquid to gas.
3. In a gas, particles have high thermal energy, which has overcome the negligible interparticle forces, allowing them to move freely and fill any space. In a solid, particles have low thermal energy and are locked in place by strong interparticle forces.

199. The ancient Indian philosopher Acharya Kanad spoke about the idea of a Parmanu (atom). He believed that all matter is made up of tiny, indivisible, and eternal particles. This ancient idea is a foundational concept in the modern understanding that all matter is particulate in nature, composed of extremely small units that are its basic building blocks.

Questions:

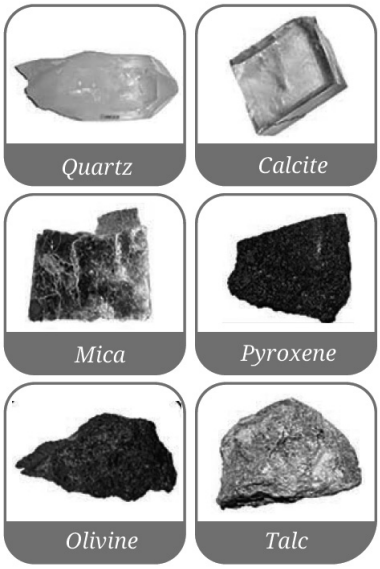
1. According to Acharya Kanad, what are the tiny, indivisible particles that make up matter called?
2. How does Kanad's idea of the Parmanu relate to the modern concept of "constituent particles"?
3. Why was it impossible for ancient philosophers to prove the existence of these particles?

Ans :

1. They are called Parmanu (atom).
2. The idea of an indivisible Parmanu is similar to the modern concept that matter is made of basic building blocks (constituent particles) that cannot be broken down further by simple physical means.
3. The particles are so small that they cannot be seen even through an ordinary microscope, so ancient philosophers lacked the technology and tools required to observe them directly and prove their existence.

****

Click Here to Buy book on Amazon



Some minerals

NCERT EXERCISE

1. Consider the following reaction where two substances, A and B, combine to form a product C:

$$A + B \longrightarrow C$$

Assume that A and B cannot be broken down into simpler substances by chemical reactions. Based on this information, which of the following statements is correct?

(i) A, B, and C are all compounds and only C has a fixed composition.
(ii) C is a compound, and A and B have a fixed composition.
(iii) A and B are compounds, and C has a fixed composition.
(iv) A, B, and C are elements, C is a compound, and has a fixed composition.

Ans :

The correct statement is (iv) A and B are elements, C is a compound, and has a fixed composition.

Reasoning:

1. Substances that cannot be broken down into simpler substances are defined as elements. Therefore, A and B are elements.
2. When different elements combine, they form a compound. Therefore, C is a compound.
3. Compounds are formed when elements combine in fixed ratios. Therefore, C has a fixed composition.

2. **Assertion :** Air is a mixture.
Reason : A mixture is formed when two or more substances are mixed, without undergoing any chemical change.

(i) Both Assertion and Reason are true and Reason is the correct explanation for Assertion.
(ii) Both Assertion and Reason are true, but Reason is not the correct explanation for Assertion.
(iii) Assertion is true, but Reason is false.
(iv) Assertion is false, but Reason is true.

Ans :

(i) Both Assertion and Reason are true and Reason is the correct explanation for Assertion.

Explanation :

The Assertion is true because air is a uniform mixture of gases like nitrogen, oxygen, and carbon dioxide. The Reason provides the correct scientific definition of a mixture, where components are mixed but do not react chemically and retain their own properties. This definition correctly explains why air is classified as a mixture.

3. Water, a compound, has different properties compared to those of the elements oxygen and hydrogen from which it is formed. Justify this statement.

Ans :

The properties of a compound are entirely different from those of its constituent elements. This is clearly seen in the case of water:

1. Hydrogen is an element that is a flammable gas and is considered a fuel.
2. Oxygen is an element that supports combustion, causing flames to burn brighter.
3. Water, the compound formed by combining hydrogen and oxygen, is a liquid that is neither flammable nor supports combustion. Instead, it is used to extinguish fire.

This demonstrates that the compound, water, has properties completely different from its elements, hydrogen and oxygen.

4. In which of the following cases are all the examples correctly matched? Give reasons in support of your answers.

(i) Elements - water, nitrogen, iron, air.

NODIA

they contain more than one substance (e.g., milk contains water, fats, proteins).

Some consumable items

3. TYPES OF PURE SUBSTANCES

Pure substances are further divided into elements and compounds.

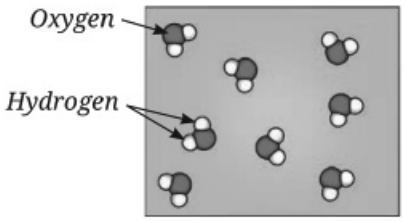
3.1 Elements

An element is the simplest form of a pure substance that cannot be broken down further into simpler substances by chemical means. They are the fundamental building blocks of all matter.

1. Particles : Each element is made up of identical particles called atoms. Atoms of different elements are different from each other.
2. Classification : Elements can be classified into metals(e.g., iron, gold), non-metals(e.g., oxygen, carbon), and metalloids(e.g., silicon).

3.2 Compounds

A compound is a pure substance formed when two or more elements combine chemically in a fixed ratio.



Depiction of molecules of water

Properties:

1. The properties of a compound are completely different from the properties of its constituent elements. For example, water (a liquid that extinguishes fire) is made from hydrogen (a flammable gas) and oxygen (a gas that supports combustion).
2. The components of a compound cannot be separated by physical methods. They can only be broken down by chemical reactions (e.g., passing electricity through water breaks it down into hydrogen and oxygen).

Download INDIA's Best Study app NODIA

3.3 Key Differences Between Mixtures and Compounds

	Property	Mixture	Compound
1.	Formation	Components are just physically mixed. No chemical reaction occurs.	Elements combine chemically to form a new substance.
2.	Properties	Components retain their individual properties.	The new substance has properties entirely different from its constituent elements.
3.	Ratio of Components	Components can be mixed in any ratio.	Elements are combined in a fixed ratio by mass.
4.	Separation	Components can be separated by physical methods (e.g., using a magnet).	Components can only be separated by chemical reactions.

NODIA

4. MINERALS

Minerals are naturally occurring, solid substances found on Earth that have a fixed chemical composition. Most minerals are compounds, made up of more than one element (e.g., quartz, calcite). Some minerals, called native minerals, are pure elements(e.g., gold, silver, copper).

burns with a 'pop' sound. The compound iron sulfide reacts with acid to produce hydrogen sulfide gas, which has a rotten egg-like smell.

The word equation for the reaction is:
Iron + Sulfur → Iron sulfide

8. Is it possible for a substance to be classified as both an element and a compound? Explain why or why not.

Ans :

No, it is not possible.
Elements and compounds are two distinct categories of pure substances. An element is the simplest form of matter that cannot be broken down into simpler substances. A compound is formed when two or more different elements combine chemically. By definition, a substance is either a fundamental building block (an element) or is made from those building blocks (a compound), but it cannot be both.

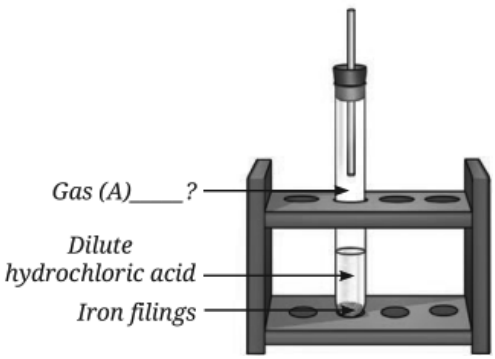
9. How would our daily lives be changed if water were not a compound but a mixture of hydrogen and oxygen?

Ans :

If water were a mixture of hydrogen and oxygen gases, our daily lives would be impossible as we know them.

1. In a mixture, substances retain their individual properties. Hydrogen is a flammable gas and oxygen supports combustion.
2. Therefore, "water" would be a highly flammable and combustible mixture of gases at room temperature, not a stable liquid.
3. It could not be used for drinking, washing, or sustaining life. The existence of oceans, rivers, and rain would be impossible.

10. Analyse Figure Identify Gas A. Also, write the word equation of the chemical reaction.



Ans :

Gas A is Hydrogen.
The figure shows iron filings reacting with dilute hydrochloric acid. This reaction produces hydrogen gas, which is colourless, has no smell, and burns with a characteristic 'pop' sound.
The word equation for the chemical reaction is:
Iron + Dilute Hydrochloric acid → Iron chloride + Hydrogen gas

11. Write the names of any two compounds made only from non-metals, and also mention two uses of each of them.

Ans :

1. Water (H_2O) : Made from the non-metals hydrogen and oxygen.
   Use 1 : It is essential for all living things.
   Use 2 : It is used to extinguish fires.
2. Carbon Dioxide (CO_2) : Made from the non-metals carbon and oxygen.
   Use 1 : It is a component of aerated water (soda water).
   Use 2 : It is used by plants during photosynthesis (inferred from its presence in air, which is essential for life).

12. How can gold be classified as both a mineral and a metal?

Ans :

1. Gold is classified as a metal because it is a type of element with metallic properties.
2. Gold is also classified as a mineral because it is a natural, solid substance found on Earth. Specifically, it is a native mineral, which is a type of mineral that exists as a pure element.

MULTIPLE CHOICE QUESTION

13. What is a mixture?

(A) Two or more substances mixed, where each retains its properties.
(B) A single substance that is unable to be broken down.
(C) A substance where components are chemically bonded.
(D) A pure substance made of only one single type of particle.

Ans :

Downloaded from www.pdf.tube

(ii) Uniform mixtures- minerals, seawater, bronze, air.
(iii) Pure substances- carbon dioxide, iron, oxygen, sugar.
(iv) Non-uniform mixtures - air, sand, brass, muddy water.

Ans :

(iii) Pure substances- carbon dioxide, iron, oxygen, sugar.
Reasons :
1. A pure substance can be either an element or a compound.
2. Carbon dioxide and sugar are compounds.
3. Iron and oxygen are elements.

Therefore, all items in this list are correctly classified as pure substances.

5. Iron reacts with moist air to form iron oxide, and magnesium burns in oxygen to form magnesium oxide. Classify all the substances involved in the above reactions as elements, compounds or mixtures, with justification.

Ans :

Reaction 1 : Iron + Moist Air → Iron Oxide
1. Iron : Element. It is a fundamental substance that cannot be broken down further.
2. Moist Air : Mixture. Air is a mixture of gases like nitrogen and oxygen , and "moist" indicates the presence of water vapour, another component.
3. Iron Oxide (Rust) : Compound. It is a new substance formed from the chemical combination of the elements iron and oxygen.

Reaction 2 : Magnesium + Oxygen → Magnesium Oxide
1. Magnesium : Element. It is a fundamental substance.
2. Oxygen : Element. It is a fundamental substance that cannot be broken down further.
3. Magnesium Oxide : Compound. It is a new substance formed from the chemical combination of the elements magnesium and oxygen.

6. Classify the following as elements, compounds, or mixtures in Table 8.3.
Carbon dioxide, sand, seawater, magnesium oxide, muddy water, aluminium, gold, oxygen, rust, iron sulfide, glucose, air, water, fruit juice, nitrogen, sodium chloride, sulfur, hydrogen, baking soda.

Table 8.3		
Elements	**Compounds**	**Mixtures**

Identify pure substances amongst these and list them below.

Ans :

Table 8.3		
Elements	**Compounds**	**Mixtures**
Aluminium	Carbon dioxide	Sand
Gold	Magnesium oxide	Seawater
Oxygen	Rust	Muddy water
Nitrogen	Iron sulfide	Air
Sulfur	Glucose	Fruit juice
Hydrogen	Water	
Sodium chloride		
Baking soda		

Pure substances
Pure substances are all the substances listed under Elements and Compounds.
They are : Aluminium, Gold, Oxygen, Nitrogen, Sulfur, Hydrogen, Carbon dioxide, Magnesium oxide, Rust, Iron sulfide, Glucose, Water, Sodium chloride, and Baking soda.

7. What new substance is formed when a mixture of iron filings and sulfur powder is heated, and how is it different from the original mixture? Also, write the word equation for the reaction.

Ans :

When a mixture of iron filings and sulfur is heated, a new substance called iron sulfide is formed. It is a compound.
It is different from the original mixture in several ways:
1. **Appearance :** The mixture is non-uniform with visible yellow sulfur and black iron particles. The compound iron sulfide is a uniform black mass.
2. **Magnetic Property :** Iron in the mixture is attracted to a magnet. The compound iron sulfide is not attracted by a magnet.
3. **Reaction with Acid :** The mixture reacts with acid to produce odorless hydrogen gas that

NODIA

CHAPTER 8

NATURE OF MATTER : ELEMENTS, COMPOUNDS AND MIXTURES

SUMMARY

1. MIXTURES

1.1 Definition and Properties of Mixtures

A mixture is formed when two or more substances (called components) are physically mixed together.

Key properties of a mixture:

1. The components do not react chemically with each other.
2. Each component retains its own individual properties.
3. The components can usually be separated by physical methods.

1.2 Types of Mixtures

Mixtures can be classified into two main types:

1. Non-uniform Mixtures : In these mixtures, the different components are unevenly mixed and can often be seen separately with the naked eye. Example : A sprout salad, where you can see the individual pieces of gram, chickpeas, and tomatoes.

Sprout salad

2. Uniform Mixtures : In these mixtures, the components are evenly distributed, and the mixture appears the same throughout. The individual components cannot be seen separately. Example : Sugar dissolved in water, or air.

Uniform mixture of sugar and water

Alloys are a special type of uniform mixture, usually of two or more metals. Examples include stainless steel, brass, and bronze.

1.3 Air : A Gaseous Mixture

Air is a uniform mixture of several gases. Its main components are nitrogen (~78%), oxygen (~21%), argon, carbon dioxide, and water vapor.

Air also contains suspended dust particles, which are considered pollutants as they are not an integral part of its composition.

2. PURE SUBSTANCES

2.1 Definition of a Pure Substance

In science, a pure substance is a type of matter that consists of only one type of particle. It cannot be separated into other kinds of matter by any physical process.

Examples like milk or ghee, often labeled 'pure', are scientifically considered mixtures because

Click Here to Buy book on Amazon

(A) Two or more substances mixed, where each retains its properties.
A mixture is a physical combination of two or more substances that are not chemically united. The individual components in a mixture maintain their own distinct chemical identities and properties.

14. In science, what is the definition of a 'pure substance'?
(A) A substance that is unadulterated and therefore safe to consume.
(B) A substance of only one particle type, not separable by physical means.
(C) Any substance that appears to be uniform throughout, like milk or juice.
(D) A mixture where all of the components are in the same physical state.

Ans :

(B) A substance of only one particle type, not separable by physical means.
The scientific definition of a pure substance is very specific. It refers to matter that has a constant composition and is made up of only one kind of particle (atom or molecule), which cannot be broken down by physical methods.

15. How is air classified in scientific terms?
(A) As an element.
(B) As a compound.
(C) As a uniform mixture.
(D) As a non-uniform mixture.

Ans :

(C) As a uniform mixture.
Air is composed of several different gases, mainly nitrogen, oxygen, argon, and carbon dioxide. Since these gases are evenly distributed and cannot be distinguished from one another, air is classified as a uniform mixture or a solution.

16. When lime water is exposed to the air for a few hours, it turns milky. This is a test for the presence of which gas in the air?
(A) Nitrogen
(B) Oxygen
(C) Water vapor
(D) Carbon dioxide

Ans :

(D) Carbon dioxide
Lime water (calcium hydroxide) reacts with carbon dioxide gas to form calcium carbonate, which is a white, insoluble solid. This solid precipitates out of the solution, giving it a cloudy or milky appearance.

17. What are alloys such as stainless steel, brass, and bronze?
(A) They are uniform mixtures of two or more metals.
(B) They are classified as pure metallic elements.
(C) They are chemical compounds formed from metals.
(D) They are non-uniform mixtures of metals and non-metals.

Ans :

(A) They are uniform mixtures of two or more metals.
Alloys are created by melting and mixing two or more metals, or a metal and another element. The resulting solid has properties different from its components and is considered a uniform mixture because the individual substances are indistinguishable.

18. What is an element?
(A) A substance formed by the chemical combination of two others.
(B) The simplest form of a pure substance, not broken down chemically.
(C) A physical mixture containing different and distinct types of atoms.
(D) Any substance that exists in a solid state at room temperature.

Ans :

(B) The simplest form of a pure substance, not broken down chemically.
An element is a fundamental building block of matter. It consists of only one type of atom and cannot be decomposed into simpler substances through any chemical reaction.

19. What is the key difference between a mixture of iron filings and sulfur powder, and the compound iron sulfide?
(A) The mixture is a black mass; the compound has yellow and grey parts.
(B) The mixture is considered a pure substance, while the compound is not.
(C) The mixture can be separated by a magnet; the compound cannot.
(D) The mixture has new properties, while the compound retains the old ones.

Ans :

NODIA

(B) Hydrogen
The chemical formula for water is H_2O, meaning each molecule has two hydrogen atoms for every one oxygen atom. When water is decomposed by electrolysis, this 2:1 ratio is maintained, producing twice the volume of hydrogen gas compared to oxygen gas.

31. Bronze is an alloy made up of _____ and _____.
(A) Copper, zinc
(B) Iron, carbon
(C) Copper, tin
(D) Aluminium, nickel

Ans :

(C) Copper, tin
Bronze is a well-known ancient alloy. Its primary components are copper, which is typically the main constituent, and tin, which is added to improve its hardness and other properties.

32. Which of the following is an example of a non-uniform mixture?
(A) Air (B) Seawater
(C) Brass (D) Muddy water

Ans :

(D) Muddy water
In muddy water, the particles of soil and silt are suspended in the water but are not dissolved. They are not evenly distributed, are often visible, and will eventually settle out, which are all characteristics of a non-uniform mixture.

33. Why is the properties of a compound like water (a fire extinguisher) completely different from its constituent elements, hydrogen (a fuel) and oxygen (supports combustion)?
(A) Because the elements are chemically bonded, forming a new substance.
(B) Because water is a simple mixture and not a chemical compound.
(C) Because water also contains trace amounts of many other elements.
(D) Because the properties change only when water becomes a liquid.

Ans :

(A) Because the elements are chemically bonded, forming a new substance.
During a chemical reaction to form a compound, the original substances (elements) are transformed. The resulting new substance (the compound) has a completely different set of chemical and physical properties from the elements it was made from.

34. When you exhale into a glass of lime water, it turns milky. This indicates that the air we exhale contains _____.
(A) More oxygen than the air we inhale
(B) Carbon dioxide
(C) Water vapor
(D) Nitrogen

Ans :

(B) Carbon dioxide
The air we exhale is a mixture of gases, including a higher concentration of carbon dioxide than the air we inhale, as it is a waste product of respiration. The reaction with lime water is a direct test for the presence of this carbon dioxide.

35. Which of the following statements about elements is incorrect?
(A) There are 118 known elements at present.
(B) They are the building blocks of all matter.
(C) All elements are solids at room temperature.
(D) They cannot be broken down into simpler substances.

Ans :

(C) All elements are solids at room temperature.
While most elements are solids, there are exceptions. Eleven elements are gases at room temperature (like oxygen and nitrogen), and two are liquids (mercury and bromine).

36. How would you classify a bowl of poha, which contains flattened rice, onions, peanuts, and spices?
(A) An element
(B) A compound
(C) A uniform mixture
(D) A non-uniform mixture

Ans :

(D) A non-uniform mixture
Poha is a non-uniform mixture because its different ingredients (components) are not evenly distributed and can be easily seen and distinguished from one another with the naked eye.

37. Atom is to element as _____ is to compound.
(A) Molecule
(B) Mixture
(C) Substance
(D) Alloy

Ans :

(A) Molecule

Downloaded from www.pdf.tube

(A) Sugar is a compound that decomposes into carbon and water.
(B) Sugar is a basic element that has a very low melting point.
(C) Sugar is a simple physical mixture of solid carbon and water.
(D) Sugar undergoes a simple physical change when it is heated.

Ans :

(A) Sugar is a compound that decomposes into carbon and water.
This is a chemical change called decomposition. The heat breaks the chemical bonds in the sugar molecules, rearranging the atoms to form new substances : black carbon (charcoal) and water (formed from hydrogen and oxygen atoms).

26. In the experiment with iron filings and sulfur, what happens when dilute hydrochloric acid is added to the compound iron sulfide (Sample B)?
(A) Odorless hydrogen gas is produced as a result of the reaction.
(B) A gas with a rotten egg-like odour is produced from the reaction.
(C) Nothing happens at all; the compound simply does not react.
(D) The iron filings within the compound are attracted to a magnet.

Ans :

(B) A gas with a rotten egg-like odour is produced from the reaction.
Iron sulfide, being a new compound, reacts differently with acid than its constituent elements. It reacts with hydrochloric acid to produce hydrogen sulfide gas, which is known for its characteristic and unpleasant smell of rotten eggs.

27. Why is the common usage of the word 'pure' on a milk carton different from its scientific meaning?
(A) 'Pure' commonly means it is white; in science, it means it is a liquid.
(B) There is no difference at all; milk is a pure substance in both contexts.
(C) 'Pure' commonly means unadulterated; in science, milk is a mixture.
(D) 'Pure' is only a marketing term that has no actual real meaning.

Ans :

(C) 'Pure' commonly means unadulterated; in science, milk is a mixture.
Commonly, 'pure' implies that nothing undesirable has been added. Scientifically, milk is a mixture because it contains multiple substances like water, fat, and proteins. Therefore, while unadulterated, it is not a pure substance in the scientific sense.

28. What are naturally occurring solid substances found on Earth with a fixed chemical composition called?
(A) Rocks (B) Alloys
(C) Sediments (D) Minerals

Ans :

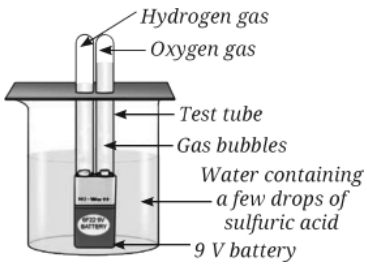
(D) Minerals
Minerals are defined as naturally formed, solid, inorganic substances that have a specific chemical composition and a characteristic crystal structure. They can be either pure elements or, more commonly, compounds.

29. Gold, silver, and copper, when found in their pure form in nature, are referred to as _____.
(A) Native minerals
(B) Alloys
(C) Compound minerals
(D) Metalloids

Ans :

(A) Native minerals
When a mineral consists of a single, pure element, it is called a native mineral or native element. Gold, silver, and copper are examples of metals that can be found in nature in their pure, uncombined elemental form.

30. In the electrolysis of water experiment as shoen in the figure , gas bubbles are collected in two test tubes. One tube collects twice the volume of gas as the other. The gas with the larger volume is _____.



(A) Oxygen
(B) Hydrogen
(C) Carbon dioxide
(D) Air

Ans :

NODIA

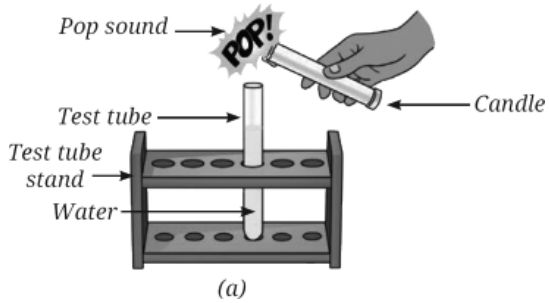
(C) The mixture can be separated by a magnet; the compound cannot.
In the mixture, iron retains its magnetic property and can be physically separated. After heating, a chemical reaction forms the compound iron sulfide, in which iron loses its original magnetic property and becomes chemically bonded to sulfur.

20. Why is water considered a compound and not an element?
(A) Because it is naturally a liquid at standard room temperature.
(B) Because it is a uniform physical mixture of hydrogen and oxygen.
(C) Because it is considered to be a scientifically pure substance.
(D) Because it can be separated into hydrogen and oxygen via electricity.

Ans :

(D) Because it can be separated into hydrogen and oxygen via electricity.
Water can be broken down into two simpler substances, hydrogen and oxygen, through a chemical process (electrolysis). Since it is composed of more than one element chemically combined, it is classified as a compound.

21. In the experiment shown in figure , a burning candle brought to the mouth of a test tube produces a 'pop' sound. This indicates the presence of which gas?



(a)

(A) Hydrogen
(B) Oxygen
(C) Carbon dioxide
(D) Nitrogen

Ans :

(A) Hydrogen
The 'pop' sound test is the characteristic chemical test for hydrogen gas. When a flame is introduced to a mixture of hydrogen and air, the hydrogen combusts rapidly, creating a small explosion that produces the distinctive sound.

22. Which of the following statements about compounds is incorrect?
(A) They are always formed when elements combine in fixed ratios by mass.
(B) They can be separated into elements by physical methods like filtration.
(C) Their properties are very different from their constituent elements.
(D) Water is a very common and well-known example of a compound.

Ans :

(B) They can be separated into elements by physical methods like filtration.
A defining characteristic of a compound is that its constituent elements are chemically bonded. These bonds cannot be broken by simple physical processes. Chemical methods, such as electrolysis or thermal decomposition, are required to separate them.

23. Air is to a uniform mixture as a sprout salad is to a(n) _____.
(A) Element
(B) Compound
(C) Non-uniform mixture
(D) Pure substance

Ans :

(C) Non-uniform mixture
This analogy contrasts two types of mixtures. Air is a uniform mixture because its gaseous components are indistinguishable. A sprout salad is a non-uniform mixture because its individual components (sprouts, tomatoes, onions) are clearly visible and not evenly distributed.

24. What are the three classifications of elements mentioned in the chapter?
(A) Solids, liquids, and gases
(B) Mixtures, compounds, and solutions
(C) Rocks, minerals, and alloys
(D) Metals, non-metals, and metalloids

Ans :

(D) Metals, non-metals, and metalloids
Elements are broadly classified based on their physical and chemical properties. The three main categories are metals (like iron), non-metals (like oxygen), and metalloids (which have properties intermediate between metals and non-metals).

25. A student heats sugar in a boiling tube. It first turns brown, then black, and small droplets of water appear near the opening. What does this experiment demonstrate?

Click Here to Buy book on Amazon

An element is made up of only one type of atom. A compound is made up of only one type of molecule, with each molecule consisting of two or more different atoms chemically bonded together.

38. The individual substances that make up a mixture are called its _____.
(A) Elements
(B) Components
(C) Particles
(D) Compounds

Ans :

(B) Components
The term 'components' refers to the distinct, individual substances that are physically combined to form a mixture. For example, in a salt water mixture, salt and water are the components.

39. Which two elements are liquid at room temperature?
(A) Gold and silver
(B) Oxygen and nitrogen
(C) Mercury and bromine
(D) Silicon and carbon

Ans :

(C) Mercury and bromine
Among all the known elements, only two exist in the liquid state under standard room temperature and pressure conditions : mercury, which is a metal, and bromine, which is a non-metal.

40. The process of separating components from a mixture, such as getting salt from seawater by evaporation, is a _____.
(A) Chemical process
(B) Nuclear process
(C) Biological process
(D) Physical process

Ans :

(D) Physical process
In a mixture, the components are not chemically bonded. Therefore, they can be separated using physical methods that rely on differences in their physical properties, such as boiling point (evaporation), magnetism, or particle size (filtration).

41. If a substance can be broken down into simpler substances, it cannot be a(n) _____.
(A) Element
(B) Mixture
(C) Compound
(D) Solution

Ans :

(A) Element
The defining characteristic of an element is that it is the simplest form of matter and cannot be decomposed into other substances by chemical means. Both compounds and mixtures consist of simpler substances.

42. A student mixes iron filings and sulfur powder to form Sample A. They then heat this mixture strongly to form a black mass, Sample B. Which sample is the mixture and which is the compound?
(A) Both Sample A and Sample B are classified as mixtures.
(B) Sample A is the mixture and Sample B is the compound.
(C) Sample A is the compound and Sample B is the mixture.
(D) Both Sample A and Sample B are classified as compounds.

Ans :

(B) Sample A is the mixture and Sample B is the compound.
Sample A is a simple physical mixture where components retain their properties. Heating Sample A causes a chemical reaction, forming a new substance, iron sulfide (Sample B), which is a compound with different properties.

43. In the Dhokra art tradition, what material is used to create the initial model of the design?
(A) Clay
(B) Wood
(C) Beeswax
(D) Molten brass

Ans :

(C) Beeswax
The Dhokra art process, a form of lost-wax casting, begins with an artist meticulously sculpting the desired figure out of beeswax. This wax model is then used to create a clay mould for the final metal casting.

44. Which of the following is NOT an example of matter?
(A) The air you breathe
(B) The water in your bottle
(C) A piece of rock
(D) The light from the sun

Ans :

(D) The light from the sun

Downloaded from www.pdf.tube

Matter is defined as anything that has mass and takes up space. Air, water, and rocks all have mass and volume. Light, along with heat and emotions, is a form of energy and does not have mass or volume.

45. What is the purpose of adding dilute sulfuric acid to water before performing electrolysis?
(A) To make the water a better conductor of electricity.
(B) To color the water so it is more visible.
(C) To produce hydrogen gas directly from the acid.
(D) To cool the water down.

Ans :

(A) To make the water a better conductor of electricity.
Pure water is a very poor conductor of electricity. Adding a small amount of an acid, like sulfuric acid, introduces ions into the water, which allows it to conduct an electric current much more effectively, enabling the electrolysis process.

46. How does a molecule differ from an atom?
(A) An atom is generally much larger in size than a molecule.
(B) An atom is the basic unit of an element; a molecule has two or more atoms.
(C) A molecule is the smallest unit of an element; an atom is for a compound.
(D) There is no actual difference between an atom and a molecule.

Ans :

(B) An atom is the basic unit of an element; a molecule has two or more atoms.
The atom is the fundamental particle of an element. A molecule is a stable particle formed when two or more atoms (either of the same element, like O_2, or different elements, like H_2O) are chemically bonded together.

47. When a burning candle is brought near a test tube containing oxygen gas, the flame _____, confirming the gas's identity.
(A) Goes out
(B) Produces a pop sound
(C) Glows brighter
(D) Does not change

Ans :

(C) Glows brighter
Oxygen is a gas that supports combustion. While it doesn't burn on its own, its presence will cause an existing flame, like that of a burning candle or splinter, to burn much more intensely and brightly.

NODIA

48. A scientist wants to separate a mixture of sand and salt. A useful first step would be to _____.
(A) Use a magnet to attract the sand
(B) Heat the mixture to melt the salt
(C) Add oil to the mixture
(D) Add water to the mixture to dissolve the salt

Ans :

(D) Add water to the mixture to dissolve the salt
This separation relies on the different physical properties of the components. Salt is soluble in water, while sand is not. By adding water, the salt will dissolve, allowing it to be separated from the insoluble sand by filtration.

49. Talcum powder is made from the mineral talc, and cement is made from minerals like calcite and quartz. In this context, talc and calcite are examples of _____.
(A) Compounds
(B) Native elements
(C) Alloys
(D) Non-uniform mixtures

Ans :

(A) Compounds
Most minerals, including talc (magnesium silicate) and calcite (calcium carbonate), are compounds. They consist of two or more different elements that are chemically bonded together in a fixed ratio.

50. Graphene aerogel is described as an environmental cleaner for oil spills because it _____.
(A) Is very heavy and causes the spilled oil to sink to the bottom
(B) Is highly porous and has a high liquid absorbing capacity
(C) Chemically reacts with the oil in order to neutralize it
(D) Is made from carbon, which has a natural attraction to oil

Ans :

(B) is highly porous and has a high liquid absorbing capacity
The structure of graphene aerogel is extremely porous, like a sponge at the nanoscale. This high porosity gives it a massive surface area, allowing it to absorb large quantities of liquids like oil relative to its own very low weight.

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

51. A uniform mixture where the different components are generally invisible even with a microscope is also known as a(n) _____.
(A) Element
(B) Compound
(C) Solution
(D) Non-uniform mixture

Ans :

(C) Solution
A solution is the specific term for a uniform mixture (also called a homogeneous mixture). In a solution, the solute particles are completely dissolved and evenly distributed throughout the solvent, making the components indistinguishable.

52. In the experiment with iron and sulfur, what was used to test the magnetic property of the samples?
(A) A battery
(B) Hydrochloric acid
(C) A burning candle
(D) A magnet

Ans :

(D) A magnet
To check for the presence of magnetic iron in the samples, a magnet was brought near them. In the mixture (Sample A), the magnet attracted the iron filings, but in the compound (Sample B), it had no effect.

53. Which of the following statements about mixtures is incorrect?
(A) The formation of a mixture is a chemical change.
(B) The components of a mixture do not react chemically with each other.
(C) The components can be mixed in any proportion.
(D) The components of a mixture can be separated by physical means.

Ans :

(A) The formation of a mixture is a chemical change.
The formation of a mixture is a physical change. No new substances are formed, and no chemical bonds are made or broken. The components simply co-exist while retaining their original chemical identities.

54. The fact that the components of air can be separated (e.g., separating oxygen from nitrogen) is evidence that air is a _____.
(A) Compound
(B) Mixture
(C) Element
(D) Pure substance

Ans :

(B) Mixture
A key property of mixtures is that their components can be separated by physical processes (in this case, fractional distillation of liquid air). Since the gases in air can be separated, it proves that they are not chemically bonded and that air is a mixture.

55. In ancient Indian medicine, Kamsya (bronze) was used to improve digestion. Kamsya is an alloy, which is a type of _____.
(A) Compound
(B) Non-uniform mixture
(C) Element
(D) Uniform mixture

Ans :

(D) Uniform mixture
Bronze is an alloy of copper and tin. Alloys are classified as uniform mixtures because their metallic components are melted and blended together so thoroughly that they form a solid solution with a consistent composition throughout.

56. Hydrogen is to element as sodium chloride (common salt) is to _____.
(A) Mixture
(B) Alloy
(C) Solution
(D) Compound

Ans :

(D) Compound
Hydrogen is a fundamental substance that cannot be broken down further, making it an element. Sodium chloride is formed from the chemical combination of two elements, sodium and chlorine, making it a compound.

57. Which element constitutes about 78% of the air?
(A) Nitrogen
(B) Oxygen
(C) Carbon dioxide
(D) Argon

Ans :

(A) Nitrogen
Air is a mixture of gases, with nitrogen being the most abundant component. It makes up

Click Here to Buy book on Amazon

approximately 78% of the Earth's atmosphere by volume.

58. A student takes a sample of seawater and allows the water to evaporate completely. A white solid residue is left behind. What does this indicate?
(A) Seawater is a pure compound called water.
(B) The water chemically reacted with the container.
(C) Seawater is a uniform mixture containing dissolved solids like salt.
(D) The white solid is a new element created by evaporation.

Ans :

(C) Seawater is a uniform mixture containing dissolved solids like salt.
The evaporation of water is a physical separation technique. The fact that a solid (mainly salt) is left behind proves that the original seawater was a mixture of water and dissolved substances. Because it appears clear, it is a uniform mixture.

59. What is a key difference between elements and compounds?
(A) Elements are mixtures, while all compounds are pure substances.
(B) Elements have one atom type; compounds have two or more bonded.
(C) Elements can be easily broken down, while compounds cannot.
(D) Compounds are always solids, while all elements are always gases.

Ans :

(B) Elements have one atom type; compounds have two or more bonded.
This is the fundamental distinction. An element's identity is defined by its single type of atom (e.g., all atoms in a sample of iron are iron atoms). A compound is formed when atoms of different elements join together in a specific way.

60. What is adulteration?
(A) A scientific process used for purifying various substances.
(B) The chemical combination of elements to form a new compound.
(C) The physical separation of a mixture into its components.
(D) An illegal process of adding cheaper or poor-quality substances.

Ans :

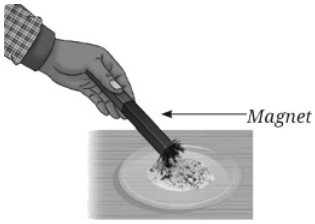
(D) An illegal process of adding cheaper or poor-quality substances.
Adulteration is the practice of debasing a product by adding an inferior substance. This is typically done to increase profits by increasing quantity or reducing costs, but it degrades the quality and can be hazardous.

61. A molecule of water consists of two atoms of _____ and one atom of _____.
(A) Hydrogen, oxygen
(B) Carbon, oxygen
(C) Hydrogen, nitrogen
(D) Sodium, chlorine

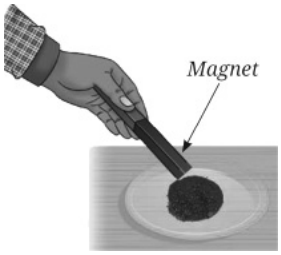
Ans :

(A) Hydrogen, oxygen
The chemical formula for water is H_2O. This indicates that each individual molecule of the compound water is formed by the chemical bonding of two hydrogen (H) atoms and one oxygen (O) atom.

62. In Figure a magnet is brought near Sample A (mixture) and Sample B (compound). The magnet only affects Sample A. This is because _____.



(a) Sample A



(b) Sample B

(A) Sample B is not made of iron
(B) Sample A contains unreacted iron which is still magnetic
(C) Sample B has become an even stronger magnet
(D) Sample A has an electric charge

NODIA

Ans :

(B) Sample A contains unreacted iron which is still magnetic
In Sample A, the iron filings are merely mixed with sulfur and retain their individual properties, including magnetism. In Sample B, the iron has chemically reacted to form iron sulfide, a new substance that is not magnetic.

63. Which of the following is NOT a characteristic of a compound?
(A) It has a fixed composition by mass.
(B) It is a pure substance.
(C) It can be separated into its constituents by physical means.
(D) Its properties are different from its constituent elements.

Ans :

(C) It can be separated into its constituents by physical means.
Because the elements in a compound are held together by strong chemical bonds, they cannot be separated by simple physical methods like filtration, evaporation, or using a magnet. Chemical reactions are required to break these bonds.

64. When making a solution of sugar in water, which substance is the component of the mixture?
(A) Only water
(B) Only sugar
(C) The glass container
(D) Both sugar and water

Ans :

(D) Both sugar and water
A mixture consists of all the individual substances that are combined. In a sugar-water solution, both the sugar and the water are distinct substances that have been physically mixed, so they are both considered components of the mixture.

65. Why can't the atoms of most elements exist independently?
(A) Because they are unstable and combine to form stable molecules.
(B) Because they are far too large to remain stable on their own.
(C) Because they are not considered to be scientifically pure substances.
(D) Because they do not have a nucleus containing protons and neutrons.

Ans :

(A) Because they are unstable and combine to form stable molecules.
Individual atoms of many elements are chemically reactive and unstable. They tend to achieve a more stable state by forming chemical bonds with other atoms, resulting in the formation of molecules (like O_2 or H_2O).

66. A substance is made of only one type of particle and cannot be separated by physical means, but it can be broken down into simpler substances by a chemical reaction. This substance is a(n) _____.
(A) Element
(B) Non-uniform mixture
(C) Compound
(D) Uniform mixture

Ans :

(C) Compound
This description fits the definition of a compound perfectly. It is a pure substance (cannot be separated physically), but it is not the simplest form of matter because it can be decomposed into its constituent elements via chemical reactions.

67. What is the direct result of a chemical reaction between two elements?
(A) The formation of a mixture.
(B) The formation of an alloy.
(C) The formation of a compound.
(D) A change in physical state only.

Ans :

(C) The formation of a compound.
A chemical reaction involves the breaking and forming of chemical bonds. When two different elements react chemically, their atoms bond together in a fixed ratio to create molecules of a new substance, which is a compound.

68. In the electrolysis of water, what are the two gaseous elements produced?
(A) Carbon and oxygen
(B) Nitrogen and oxygen
(C) Hydrogen and carbon dioxide
(D) Hydrogen and oxygen

Ans :

(D) Hydrogen and oxygen
Electrolysis is the process of using electricity to decompose a compound. When an electric current is passed through water (H_2O), it breaks down into its constituent elements, which are hydrogen gas and oxygen gas.

Downloaded from www.pdf.tube

Elements are the fundamental building blocks of all matter and are pure substances that cannot be broken down further into any simpler substances.

105. Why do scientists consider milk a mixture, not a pure substance?

Ans :

Scientists consider milk a mixture because it is made of more than one substance, such as water, fats, and proteins, not a single type of particle.

106. What is a compound in chemical terms?

Ans :

A compound is a pure substance formed when two or more different elements are chemically combined in a fixed ratio, creating something entirely new.

107. How can you prove the presence of carbon dioxide in the air?

Ans :

You can prove the presence of carbon dioxide in the air by exposing lime water to it, which will turn milky due to a reaction.

108. What defines the components of a mixture?

Ans :

The components of a mixture are the individual substances that are mixed together, with each one retaining its own distinct properties without any chemical reaction.

109. Why can the components of a sprout salad be easily identified?

Ans :

The components of a sprout salad can be easily identified because it is a non-uniform mixture where ingredients like chickpeas and tomato remain visible.

110. What are alloys, and what is a common example?

Ans :

Alloys are uniform mixtures of metals, like brass, which is a mixture of copper and zinc, where individual substances cannot be seen.

111. Compare the properties of a compound to its constituent elements.

Ans :

A compound has properties that are entirely different from those of the elements that form it, as seen when water extinguishes fire, unlike its elements.

112. What did the ancient Indian philosopher Acharya Kanad believe about matter?

Ans :

Acharya Kanad believed that matter is made up of tiny, indivisible, and eternal particles which he named 'Parmanu', a concept similar to modern atoms.

113. How does the common use of the word 'pure' differ from its scientific definition?

Ans :

In common use, 'pure' means unadulterated, while in science, 'pure' means the substance consists of only one type of particle with no other substances present.

114. What happens to water when electricity is passed through it?

Ans :

When electricity is passed through water, it undergoes a chemical change and breaks down into its constituent elements, which are hydrogen and oxygen gas.

115. Why can't elements be broken down into simpler substances?

Ans :

Elements cannot be broken down further because they are the fundamental building blocks of all matter, each made up of identical particles called atoms.

116. What are minerals, and can they be pure elements?

Ans :

Minerals are natural, solid substances found on Earth; most are compounds, but some, called native minerals like gold or silver, can be pure elements.

117. Explain why a mixture of iron and sulfur is different after heating.

Ans :

After heating, the iron and sulfur mixture forms a new substance, a compound, with completely different properties, and its components can no longer be separated.

NODIA

Ans :

(C) The ring is made only of gold atoms and is an element.
For a scientist, "pure gold" means the object consists of only one substance : the element gold. This implies that it is composed entirely of gold atoms, with no other elements mixed or bonded with it.

76. Two or more atoms combined to form a stable particle of an element is called a(n) _____.
(A) Compound (B) Mixture
(C) Atom (D) Molecule

Ans :

(D) Molecule
For many elements whose atoms cannot exist independently, they combine with other atoms (often of the same element) to form a stable unit. This stable combination of two or more bonded atoms is called a molecule (e.g., O_2).

77. Why are alloys like stainless steel often used instead of pure metals like iron?
(A) Because the alloys are considered to be pure elements.
(B) Because the alloys are generally much cheaper to produce.
(C) Because alloys can be easily separated back into original metals.
(D) Because mixing metals creates new, more useful properties.

Ans :

(D) Because mixing metals creates new, more useful properties.
Alloys are created to enhance the properties of metals. For example, pure iron rusts easily. Adding chromium and nickel to create the alloy stainless steel makes it much more resistant to corrosion, stronger, and more durable.

78. How does a solution like seawater differ from a compound like pure water?
(A) Seawater is a pure substance, while pure water is a simple mixture.
(B) Pure water can be separated by evaporation, while seawater cannot.
(C) The salt to water ratio can vary; the H to O ratio in water is fixed.
(D) Seawater is non-uniform, while pure water is a uniform mixture.

Ans :

(C) The salt to water ratio can vary; the H to O ratio in water is fixed.
A key difference between mixtures and compounds is composition. The components of a mixture (like salt in seawater) can be present in variable ratios. The elements in a compound (like H and O in water) are always present in a fixed, definite ratio.

79. A substance is a solid at room temperature, has a uniform appearance, and cannot be separated into components by a magnet or by dissolving in water. However, upon strong heating, it breaks down into two different simpler substances. The original substance was a(n)_____.
(A) Mixture
(B) Compound
(C) Element
(D) Alloy

Ans :

(B) Compound
The description indicates a pure substance (uniform, cannot be separated physically) that can be decomposed by a chemical process (strong heating). This perfectly matches the definition of a compound.

80. Which of the following is NOT a mixture?
(A) Carbon dioxide
(B) Air
(C) Soil
(D) Lemonade

Ans :

(A) Carbon dioxide
Carbon dioxide (CO_2) is a pure substance, specifically a compound made of carbon and oxygen atoms chemically bonded in a fixed ratio. Air, soil, and lemonade are all mixtures of various different substances.

81. Metal is to element as water is to _____.
(A) Element
(B) Mixture
(C) Liquid
(D) Compound

Ans :

(D) compound
This analogy classifies substances based on their fundamental nature. A metal like iron or gold is an element. Water (H_2O) is a substance formed from the chemical combination of two elements, making it a compound.

Click Here to Buy book on Amazon

82. The Air Quality Index (AQI) is a tool used to describe the quality of air, which is a _____.

(A) Pure element

(B) Pure compound

(C) Uniform mixture

(D) Non-uniform mixture

Ans :

(C) Uniform mixture

Air is a uniform mixture of gases. The AQI measures the concentration of various pollutants (like dust, ozone, etc.) within this mixture to assess how clean or polluted it is at a given time and place.

Download INDIA's Best Study app NODIA

TRUE AND FALSE

83. In any mixture, the individual components react chemically to form an entirely new substance.

Ans :

False

In a mixture, the components do not react chemically with each other; each substance retains its own individual properties.

84. A pure substance, in scientific terms, is one that consists of only a single type of particle.

Ans :

True

When a scientist describes something as pure, it means the substance is made up of the same type of particles.

85. An element is a type of matter that can be easily broken down into simpler substances by physical means.

Ans :

False

Elements are the simplest form of pure substances and cannot be broken down further into simpler substances.

86. A compound is formed when two or more elements are combined chemically in a fixed ratio.

Ans :

True

Compounds are formed when different elements combine chemically in fixed ratios to create something entirely new.

87. The properties of a compound are always the same as the properties of the individual elements that make it up.

Ans :

False The properties of a compound are different from those of its constituent elements. For example, water can extinguish a fire, but the oxygen in it supports combustion.

88. Air is considered a pure substance because its different components are not visible.

Ans :

False

Air is a uniform mixture of several gases, including nitrogen, oxygen, and carbon dioxide, not a pure substance.

89. Alloys like stainless steel and brass are classified as uniform mixtures.

Ans :

True

Alloys are mixtures where components are combined so uniformly that the entire mixture appears as a single substance.

NODIA

90. The elements within a compound can be separated from each other using simple physical methods like evaporation.

Ans :

False

The constituent elements of a compound are chemically bonded and cannot be separated by any physical method.

91. Water is a compound composed of hydrogen and oxygen atoms combined in a fixed 2:1 ratio.

Ans :

True

A molecule of water is made of two hydrogen atoms and one oxygen atom, which are chemically combined in a fixed 2:1 ratio.

92. In science, the term "pure" means the same as "unadulterated," as seen on food packaging.

Ans :

False
In common usage, "pure" means unadulterated. In science, a pure substance consists of only one type of particle; for example, milk is a mixture, not a pure substance.

93. Elements are broadly classified into two main groups : metals and compounds.

Ans :

False Elements are classified into metals and non-metals. Some substances with intermediate properties are known as metalloids.

94. Most minerals that are found on Earth are compounds made up of more than one element.

Ans :

True
Most minerals are compounds composed of multiple elements, although a few, known as native minerals, can be pure elements like gold or sulfur.

Download INDIA's Best Study app NODIA

95. A mixture is considered non-uniform if its different components are generally visible and not evenly distributed.

Ans :

True
Non-uniform mixtures are those in which the different components can typically be seen with the naked eye and are not spread evenly throughout.

96. Sugar is considered an element because it is a simple, pure substance.

Ans :

False Sugar is a compound made up of the elements carbon, hydrogen, and oxygen. It can be broken down into these components through a chemical change like heating.

97. Everything around us, including light, heat, and emotions, is a form of matter.

Ans :

False
Light, heat, electricity, and even thoughts and emotions are part of our world, but they are not made of matter.

VERY SHORT QUESTIONS

98. What is a mixture according to scientific definition?

Ans :

A mixture is when two or more substances are combined, where each substance retains its own individual properties and does not chemically react.

99. How would you differentiate a uniform mixture from a non-uniform mixture?

Ans :

In a uniform mixture, components are evenly distributed and cannot be distinguished, while in a non-uniform mixture, the different components are generally visible.

NODIA

100. Define what a pure substance is in science.

Ans :

In science, a pure substance is a kind of matter that cannot be separated into other kinds of matter by any physical process.

101. Why is stainless steel considered an alloy and a mixture?

Ans :

Stainless steel is an alloy because it is a uniform mixture of iron, nickel, chromium, and carbon, where the individual components cannot be seen.

102. What are the two main types of pure substances?

Ans :

The two main types of pure substances are elements, which are the simplest substances, and compounds, which are formed from chemically combined elements.

103. Explain why air is classified as a uniform mixture.

Ans :

Air is a uniform mixture because its main components, such as nitrogen and oxygen, are evenly distributed and cannot be distinguished from one another.

104. What is the scientific meaning of an 'element'?

Ans :

69. Water is to compound as oxygen is to _____.
(A) Element (B) Mixture
(C) Solution (D) Alloy

Ans :

(A) Element
This analogy classifies substances. Water is a compound because it is made of hydrogen and oxygen atoms bonded together. Oxygen is an element because it is a fundamental substance made of only oxygen atoms and cannot be broken down further.

70. A black sheet of paper is left near an open window and after a few hours, tiny particles are seen on its surface. What does this simple observation show?
(A) The paper is reacting with sunlight.
(B) The air contains suspended dust particles.
(C) The air is a compound.
(D) The black paper is magnetic.

Ans :

(B) The air contains suspended dust particles.
This activity demonstrates that the air is not just a mixture of gases but also contains tiny solid particles like dust and soot. These particles, which are pollutants, eventually settle out of the air onto surfaces.

71. What is the main difference between a uniform and a non-uniform mixture?
(A) Uniform mixtures are always solids, while non-uniform are liquids.
(B) In a uniform mixture, components are evenly distributed and indistinguishable.
(C) Non-uniform mixtures have components that are chemically bonded.
(D) Uniform mixtures can be separated, but non-uniform mixtures cannot.

Ans :

(B) In a uniform mixture, components are evenly distributed and indistinguishable.
The key difference is the visibility and distribution of the components. In a uniform (homogeneous) mixture like salt water, the components are indistinguishable. In a non-uniform (heterogeneous) mixture like salad, the components are visible and unevenly distributed.

72. Which of the following is NOT a property of a chemical compound?
(A) It has properties that are different from its constituent elements.
(B) It is formed from elements combined in a fixed ratio.
(C) It is considered a pure substance.
(D) Its components can be separated by filtration.

Ans :

(D) Its components can be separated by filtration.
Filtration is a physical separation technique used for mixtures of solids and liquids. The elements in a compound are chemically bonded and cannot be separated by such physical means; a chemical reaction is required.

73. When iron reacts with dilute hydrochloric acid, it produces _____ gas, whereas when iron sulfide reacts with the acid, it produces _____ gas.
(A) Oxygen, hydrogen
(B) Hydrogen, hydrogen sulfide
(C) Hydrogen sulfide, hydrogen
(D) Carbon dioxide, oxygen

Ans :

(A) Oxygen, hydrogen
The experiment shows that a mixture and a compound react differently. The iron in the mixture reacts to produce hydrogen gas. The iron sulfide compound reacts to produce hydrogen sulfide gas, a completely different substance with a distinct smell.

74. Quartz, calcite, and mica are common examples of _____.
(A) Alloys
(B) Pure metals
(C) Minerals that are compounds
(D) Gaseous mixtures

Ans :

(C) minerals that are compounds
Most minerals found in the Earth's crust are compounds. Quartz (silicon dioxide), calcite (calcium carbonate), and mica (a silicate) are all examples of common rock-forming minerals that are chemical compounds, not pure elements.

75. A jeweller claims a gold ring is "pure gold". In scientific terms, what does this mean?
(A) The ring is a uniform mixture of gold and other metals.
(B) The ring is a compound of gold and oxygen.
(C) The ring is made only of gold atoms and is an element.
(D) The ring has been cleaned and is free from dirt.

Downloaded from www.pdf.tube

118. What are the constituent particles of a substance?

Ans :

Constituent particles are the basic, tiny units that make up a larger piece of a substance or material, like the particles that form chalk.

119. How is adulteration different from making a scientific mixture?

Ans :

Adulteration involves adding cheaper substances to a product to increase quantity, while a scientific mixture is a combination of pure substances that retain their properties.

120. What are the two liquid elements at room temperature?

Ans :

The only two elements that exist as liquids at room temperature are mercury, which is a metal, and bromine, which is a non-metal.

121. What makes graphene aerogel a 'wonder' material?

Ans :

Graphene aerogel is considered a 'wonder' material because it is made from carbon and is the lightest material on Earth, with high absorbing capacity.

122. How do chemists use their knowledge of elements and compounds?

Ans :

Chemists use their knowledge of how elements combine to form compounds to invent life-saving medicines, vaccines, and fertilisers to enhance crop production globally.

123. What are metalloids, and can you name an example?

Ans :

Metalloids are elements that possess intermediate properties between those of metals and non-metals; an example of a metalloid is silicon or boron.

124. How is a molecule of an element like hydrogen formed?

Ans :

A molecule of an element like hydrogen is formed when two or more atoms of that element, which cannot exist independently, combine to form a stable particle.

125. Why is it incorrect to call light and heat 'matter'?

Ans :

Light and heat are not considered matter because they do not have mass or take up space, unlike elements and compounds which are tangible substances.

126. What happens to sugar when it is heated in a test tube?

Ans :

When sugar is heated, it decomposes, turning brown and then blackish as it chars, leaving behind carbon and producing small droplets of water.

127. How can you test for hydrogen gas in a laboratory setting?

Ans :

To test for hydrogen gas, you can bring a burning candle or splinter near the mouth of the test tube containing the gas. A 'pop' sound confirms its presence.

128. Why are building materials like steel and concrete considered mixtures?

Ans :

Materials like steel and concrete are considered mixtures because they are combinations of different substances that are physically mixed together rather than chemically bonded.

129. What is the composition of the compound sodium chloride?

Ans :

Sodium chloride, or common salt, is a compound made up of particles of the elements sodium and chlorine combined in a fixed 1:1 ratio.

NODIA

130. Can the components of a compound be separated by physical methods?

Ans :

No, the constituent elements of a compound, such as hydrogen and oxygen in water, cannot be separated from each other by any physical method.

131. Explain the purpose of separating mixtures in science.

Ans :

148. What is the scientific basis for classifying substances as metals, non-metals, or metalloids?

Ans :

Substances are classified based on their properties. Metals, like iron and gold, have specific physical and chemical characteristics. Non-metals, such as carbon and oxygen, have different properties. Metalloids, like silicon, are a unique category because they exhibit intermediate properties that fall between those of typical metals and non-metals, giving them a distinct classification in the study of elements.

149. Explain why alloys like brass and bronze are considered uniform mixtures.

Ans :

Alloys like brass (a mixture of copper and zinc) and bronze (a mixture of copper and tin) are considered uniform mixtures because their components are mixed so thoroughly that they appear as a single, consistent substance throughout. It is impossible to see the individual metal particles with the naked eye, fulfilling the definition of a uniform mixture.

150. How is the concept of 'pure' in science different from its everyday meaning on food labels?

Ans :

In everyday language, 'pure' on a food label implies the product is unadulterated, meaning no cheaper or poor-quality substances have been added. In science, a pure substance is one that consists of only a single type of particle. Therefore, milk, though 'pure' in the common sense, is a mixture to a scientist because it contains water, fats, and proteins.

151. What are native minerals, and how do they differ from most other minerals?

Ans :

Native minerals are unique because they are composed of pure elements rather than being compounds. Examples include:

- Metals such as gold, silver, and copper, which are found in their elemental form in nature.
- Non-metals like sulfur and carbon can also be found as native minerals.

This contrasts with most minerals, which are compounds made up of more than one element chemically bonded together.

152. What was the key difference between Sample A and Sample B in Activity 8.5?

Ans :

Sample A was a mixture of iron filings and sulfur powder, where the components retained their individual properties and could be separated by physical means, such as using a magnet. Sample B, on the other hand, was a compound (iron sulfide) formed by heating Sample A. It had completely new properties and its components could no longer be separated physically.

153. The table compares the properties of water with its constituent elements, hydrogen and oxygen. How does this data demonstrate the fundamental difference between a compound and its elements?

Substance	**State at Room Temp.**	**Combustibility**
Hydrogen	Gas	Highly flammable (burns with a pop sound)
Oxygen	Gas	Supports combustion (makes flame glow brighter)
Water	Liquid	Extinguishes fire

Ans :

The table shows that the properties of the compound, water, are completely different from its constituent elements, hydrogen and oxygen. While hydrogen is flammable and oxygen supports burning, water extinguishes fire, proving that compounds have unique properties distinct from the elements that form them.

154. How do material scientists contribute to innovation using their knowledge of mixtures and compounds?

Ans :

Material scientists use their understanding of compounds and mixtures to design and create new materials with specific, unique properties. A key example is the development of alloys like stainless steel, which is engineered to be stronger and more durable than pure iron by mixing it with other elements. This innovation leads to advancements in construction, technology, and everyday products.

Click Here to Buy book on Amazon

- Each gas in the air retains its individual properties; for example, oxygen supports combustion while nitrogen does not.
- The composition of air can vary slightly from place to place, which is not true for a compound with a fixed ratio.

141. What are the key characteristics of a chemical compound?

Ans :

A chemical compound is formed when different elements combine chemically in a fixed ratio, creating an entirely new substance. The properties of the compound are completely different from those of its constituent elements. Importantly, the elements within a compound cannot be separated by any physical methods; they require a chemical reaction to be broken down into simpler substances.

142. How does the process of heating sugar demonstrate that it is a compound?

Ans :

Heating sugar demonstrates it is a compound through the process of decomposition. The key observations are:

- When heated, sugar breaks down and leaves behind a black substance, which is carbon.
- Small droplets of water are also formed during this process, indicating the presence of hydrogen and oxygen.
- Since sugar breaks down into simpler substances (carbon, hydrogen, and oxygen), it is classified as a compound.

143. Why are elements considered the fundamental building blocks of matter?

Ans :

Elements are considered the fundamental building blocks of all matter because they are pure substances that cannot be broken down into simpler substances through any chemical or physical means. Every substance, whether it is a compound or a mixture, is ultimately composed of one or more of these basic elements, each with its own unique type of particles called atoms.

144. Explain the difference between elements, compounds, and mixtures with examples.

Ans :

The key differences are as follows:

- **Elements** are pure substances that cannot be broken down, like iron or oxygen.
- **Compounds** are pure substances formed when elements chemically combine in a fixed ratio, like water (H_2O).
- **Mixtures** consist of two or more substances that are physically mixed but not chemically bonded, like air or a salad.

145. Describe the experiment of passing an electric current through water (electrolysis).

Ans :

The experiment involves filling a beaker with water and a few drops of dilute sulfuric acid, then placing a 9V battery inside. Two test tubes filled with this water are inverted over the battery's terminals. After some time, gas bubbles form at both terminals and collect in the test tubes, demonstrating that water is being broken down.

NODIA

146. The table lists different alloys and their main components. Although these alloys appear uniform, explain why they are classified as mixtures and not compounds.

Alloy	**Main Components**
Stainless Steel	Iron, Chromium, Nickel, Carbon
Brass	Copper, Zinc
Bronze	Copper, Tin

Ans :

Alloys are classified as mixtures because their components are physically mixed and not chemically combined in a fixed ratio. The individual metals retain their properties within the mixture, even though they are blended so uniformly that they appear as a single substance.

147. How do we identify the two gases produced during the electrolysis of water?

Ans :

The two gases produced during the electrolysis of water are identified using a burning candle. The key indicators are:

- One gas, when tested, will extinguish the flame with a distinct 'pop' sound, which confirms the presence of hydrogen gas.
- The other gas will cause the flame of the burning candle to glow much brighter, which is the characteristic test for oxygen gas.

In science, the primary purpose of separating the components of a mixture is to obtain the individual pure substances that make up that mixture.

132. What did you observe about the volume of gases in Activity 8.3?

Ans :

In the activity, the volume of gas collected in the two test tubes was not the same, indicating different amounts were produced from the water.

133. Why do we consider the components of a mixture to not react chemically?

Ans :

We consider the components of a mixture to not react chemically because each substance retains its own individual properties after being mixed with other substances.

134. What is the significance of the fixed ratio of elements in a compound?

Ans :

The fixed ratio of elements in a compound is significant because it defines the compound's unique chemical identity and properties, which are different from its elements.

135. How is Dhokra art an example of using mixtures in traditional crafts?

Ans :

Dhokra art uses mixtures by filling a clay mould with molten brass or bronze, which are alloys, to create strong, shiny, golden-coloured figures.

136. Why does lime water react with air but not with pure nitrogen?

Ans :

Lime water reacts with air because air is a mixture containing carbon dioxide. It does not react with pure nitrogen, which does not participate in this reaction.

137. Can you determine if a substance is a mixture or a compound by appearance alone?

Ans :

No, appearance alone is not sufficient because uniform mixtures like alloys can look like a single substance, similar to how compounds and elements appear.

SHORT ANSWER QUESTIONS

138. Describe the main differences between a uniform and a non-uniform mixture.

Ans :

A uniform mixture, like sugar dissolved in water, has its components evenly distributed, so they cannot be seen separately even with a microscope. In contrast, a non-uniform mixture, such as a sprout salad, has components that are not evenly mixed, making them generally visible to the naked eye or with a magnifying device.

139. The table shows the results of an experiment comparing an unheated mixture of iron and sulfur (Sample A) with the substance formed after heating (Sample B). Based on the observations, explain why Sample A is a mixture and Sample B is a compound.

Test	**Observation for Sample A**	**Observation for Sample B**
Appearance	Yellow sulfur and grey iron particles are visible	A uniform black mass
Magnet Test	Iron filings get attracted to the magnet	Not attracted to the magnet
Acid Test	Produces odorless hydrogen gas	Produces hydrogen sulfide gas (rotten egg smell)

Ans :

Sample A is a mixture because its components (iron and sulfur) retain their individual properties, like magnetism, and can be physically separated. Sample B is a compound (iron sulfide) because a new substance with entirely different properties was formed, and the original components cannot be separated physically.

140. Explain why air is considered a mixture and not a compound.

Ans :

Air is considered a mixture for the following reasons:

- Its components, like nitrogen and oxygen, are physically mixed and not chemically bonded.

Downloaded from www.pdf.tube

155. Why are dust particles in the air considered pollutants and not integral components?

Ans :

Dust particles are considered pollutants because their presence and concentration in the air are not constant; they vary significantly from time to time and from one place to another. Unlike the primary gases of the atmosphere, such as nitrogen and oxygen, which form a consistent mixture, dust particles are foreign substances suspended in the air that can affect its quality.

156. What happens when dilute hydrochloric acid is added to the mixture of iron and sulfur?

Ans :

When dilute hydrochloric acid is added to the mixture of iron and sulfur, a chemical reaction occurs only with the iron. The observations are:

- The iron reacts to form iron chloride and hydrogen gas.
- The hydrogen gas produced is colourless, has no smell, and burns with a characteristic 'pop' sound.
- The sulfur, however, does not react and is left as a yellow solid at the bottom of the test tube.

157. How does the ancient Indian use of 'Kamsya' show an early understanding of alloys?

Ans :

The ancient Indian use of 'Kamsya' (Bronze) demonstrates an early understanding of alloys because it was intentionally created by mixing two different metals, copper and tin, in specific proportions (4 parts copper to 1 part tin). This mixture, or alloy, was recognized for having distinct properties from its constituent metals and was even used for medicinal purposes, such as improving digestion and boosting immunity.

158. Can a substance be both a mineral and a metal? Explain with an example.

Ans :

Yes, a substance can be both a mineral and a metal. This occurs with native minerals, which are pure elements found in nature. For example, gold is a metal because of its physical and chemical properties. It is also classified as a mineral because it is a natural, solid substance found on Earth with a fixed chemical composition (in this case, just the element gold).

159. Classify the substances in the table as either uniform or non-uniform mixtures and provide a reason for your classification of 'Air' and 'Sand and water'.

Mixture	**Classification (Uniform/ Non-uniform)**
Air	Uniform
Seawater	Uniform
Sand and water	Non-uniform
Sprout Salad	Non-uniform

Ans :

Air is a uniform mixture because its components (gases like nitrogen and oxygen) are evenly distributed and cannot be seen separately. Sand and water form a non-uniform mixture because the sand particles do not dissolve and are visibly separate from the water.

NODIA

160. What evidence from Activity 8.1 demonstrates that a chemical change occurred?

Ans :

The evidence for a chemical change in Activity 8.1 is the formation of a new substance. The key points are:

- The initially colourless lime water (calcium hydroxide) turns milky when exposed to air.
- This is due to a reaction with carbon dioxide in the air, which forms calcium carbonate, an insoluble white solid.
- The creation of a new substance with different properties (insoluble and white) is a clear indicator of a chemical change.

161. Why is it important to understand the difference between matter and non-matter like light or heat?

Ans :

Understanding the difference is crucial for a clear scientific view of the world. Matter, which includes elements, compounds, and mixtures, is defined as anything that has mass and takes up space. Non-matter, such as light, heat, and emotions, are forms of energy or concepts that do not have these physical properties. This distinction helps us accurately categorize and study the physical world versus the energetic or abstract phenomena within it.

Download INDIA's Best Study app NODIA

The salad is a classic example of a non-uniform mixture, where each component retains its individual properties.

Questions:

1. What are the individual substances that make up a mixture called?
2. Is the sprout salad a uniform or non-uniform mixture? Explain your reasoning.
3. If the chef added salt and it dissolved completely, would the resulting salty dressing be a uniform or non-uniform mixture?

Ans :

1. They are called its components.
2. It is a non-uniform mixture because the different components (green gram, chickpeas, etc.) are generally visible with the naked eye.
3. The salt dressing would be a uniform mixture because the components would be evenly distributed and could not be distinguished separately.

184. A student mixes iron filings and sulfur powder, creating Sample A. The components are visible, and the iron can be separated with a magnet. She then heats another portion of the mixture, creating a new uniform black mass, Sample B, which is not attracted to a magnet. This new substance, iron sulfide, is a compound with completely different properties.

Questions:

1. In Sample A (the mixture), do the components retain their individual properties?
2. Why does the magnet have no effect on Sample B (the compound)?
3. Compare Sample A and Sample B, explaining why one is a mixture and the other is a compound.

Ans :

1. Yes, in the mixture (Sample A), the components retain their properties, such as the iron filings being attracted to a magnet.
2. The magnet has no effect because a chemical reaction formed a new substance, the compound iron sulfide, which has completely different properties from its elements.
3. Sample A is a mixture because its components are not chemically bonded and can be separated by physical means. Sample B is a compound because a chemical reaction occurred, forming a new substance where elements are chemically combined in a fixed ratio.

185. At a grocery store, a student sees a milk carton labeled "Pure Milk." In common usage, "pure" means the milk is unadulterated. However, in science class, she learned that from a scientific perspective, milk is not a pure substance. It is a mixture of water, fats, proteins, and other substances, which are not all the same type of particle.

Questions:

1. In common usage, what does the word 'pure' on a food pack mean?
2. What is the scientific definition of a pure substance?
3. Why would a scientist consider milk to be a mixture rather than a pure substance?

Ans :

1. In common usage, 'pure' means the product is unadulterated.
2. A pure substance is one that consists of the same type of particles and has no other substance present in it.
3. A scientist considers milk a mixture because it is made of more than one substance (water, fats, proteins), whereas a pure substance must consist of only one type of particle.

186. In a lab demonstration, a teacher passes an electric current through water. Bubbles of two different gases are collected in separate test tubes. One gas is identified as hydrogen (makes a "pop" sound) and the other as oxygen (makes a flame glow brighter). This experiment shows that water can be broken down into simpler substances, proving it is a compound.

Questions:

1. What two elements is water composed of?
2. Why is passing electricity through water considered a chemical change, not a physical one?
3. Hydrogen is a fuel, and oxygen supports combustion, yet water extinguishes fire. What does this reveal about a compound's properties?

Ans :

1. Water is composed of hydrogen and oxygen.
2. It is a chemical change because water is broken down into entirely new substances (hydrogen and oxygen).
3. This reveals that the properties of a compound (water) are completely different from the properties of its constituent elements (hydrogen and oxygen).

Click Here to Buy book on Amazon

made of carbon, hydrogen, and oxygen elements chemically combined in a fixed ratio. Air is a mixture of gases that are not chemically bonded.

170. Can you name two solid elements that become liquid at a temperature slightly above room temperature?

Ans :

Yes, there are two solid elements that have very low melting points and become liquid at a temperature just slightly above room temperature, around 30°C. These elements are:

- Gallium
- Caesium

This unique property distinguishes them from most other metals, which have much higher melting points.

171. How does understanding the properties of elements and compounds aid in creating life-saving medicines?

Ans :

Chemists leverage their deep understanding of how different elements combine to form compounds with specific properties. By carefully selecting and bonding elements, they can design and synthesize new compounds that act as life-saving medicines or vaccines. These new molecules are created to interact with biological systems in a targeted way to fight diseases, demonstrating the critical role of chemistry in healthcare.

172. What is the composition of air as a mixture?

Ans :

Air is a uniform mixture primarily composed of several gases. The main components are:

- Nitrogen, which makes up about 78% of the air and does not support combustion.
- Oxygen, which constitutes about 21% and is essential for respiration and combustion.
- Other gases like argon, carbon dioxide, and water vapour are present in smaller amounts.

LONG ANSWER QUESTIONS

173. Explain in detail the differences between mixtures and compounds, providing experimental evidence.

Ans :

The primary differences between mixtures and compounds can be demonstrated with the iron and sulfur experiment.

- **Composition** : A mixture, like iron and sulfur mixed without heat, has components in any ratio, while a compound like iron sulfide has a fixed ratio.
- **Properties** : In the mixture, iron retains its magnetic property, and sulfur keeps its yellow color. In the compound, the new black substance is not magnetic and shows entirely new properties.
- **Separation** : The iron in the mixture can be physically separated with a magnet. The compound cannot be separated by physical means; it requires a chemical reaction.
- **Chemical Reaction** : The mixture does not involve a chemical reaction, whereas the compound is formed through one, initiated by heating.

174. Describe the complete process of electrolysis of water and the tests for the resulting products.

Ans :

The process of electrolysis of water involves the following key steps:

- **Preparation** : A beaker is filled with water, and a few drops of dilute sulfuric acid are added to make it conductive. A 9V battery is placed inside the beaker.
- **Gas Collection** : Two test tubes are completely filled with the acidified water and carefully inverted over each of the battery's terminals without letting air in.
- **Reaction** : As electricity passes through the water, gas bubbles form at both terminals and collect at the top of the test tubes, displacing the water.
- **Testing Products** : To identify the gases, a burning candle is brought to the mouth of each test tube. The gas that burns with a 'pop' sound is hydrogen, and the gas that makes the flame glow brighter is oxygen.

Download INDIA's Best Study app NODIA

175. How would you classify air, water, and stainless steel as elements, compounds, or mixtures? Justify each classification.

Ans :

Downloaded from www.pdf.tube

162. What are some examples of mixtures based on the physical state of their components?

Ans :

Mixtures can be classified based on the physical states of their components. Some examples include:

- **Gas and Gas** : Air, which is a uniform mixture of nitrogen, oxygen, and other gases.
- **Gas and Liquid** : Aerated water (soda), where carbon dioxide gas is dissolved in liquid water.
- **Solid and Liquid** : Seawater, a uniform mixture where salts are dissolved in water.
- **Solid and Solid** : Alloys like brass, which is a uniform mixture of solid copper and zinc.

163. Describe the composition of water as a compound.

Ans :

Water is a compound composed of two different elements : hydrogen and oxygen. These elements are combined chemically, not just mixed. The composition is fixed, with the ratio of the number of atoms of hydrogen to oxygen in every water molecule always being 2:1. This fixed chemical combination gives water properties that are entirely different from those of hydrogen and oxygen alone.

164. Why is it said that the components of a mixture can be separated by physical processes?

Ans :

The components of a mixture can be separated by physical processes because they are not chemically bonded together; each substance retains its individual properties. For example, in a mixture of iron filings and sulfur, a magnet can be used to physically pull the iron away from the sulfur. This is not possible with a compound, which requires a chemical reaction to be broken down.

165. What are some of the key uses of minerals in our everyday life?

Ans :

Minerals are fundamental to many items we use daily. For instance:

- Cement, a crucial building material, is made from minerals like calcite, quartz, and iron oxide.
- Talcum powder is directly made from the mineral talc, which is known for its softness.
- Many metals used in construction and technology, like iron and aluminium, are extracted from mineral ores found in rocks.

166. How do elements, compounds, and mixtures play a role in agriculture?

Ans :

The knowledge of elements, compounds, and mixtures is vital for agriculture. Chemists create compounds like fertilisers by combining specific elements, which significantly enhances crop production and helps feed the global population. Furthermore, the soil itself is a complex mixture of minerals, organic matter, and water, and understanding its composition helps in managing it effectively for better crop yields.

167. What is the difference between the reaction of Sample A and Sample B with hydrochloric acid?

Ans :

The key difference in their reactions is the gas produced. In Sample A (the mixture), only the iron reacts with the acid to produce hydrogen gas, which is odourless and burns with a 'pop' sound. In Sample B (the compound iron sulfide), the entire substance reacts with the acid to produce hydrogen sulfide gas, which is also colourless but has a distinct rotten egg-like odour.

168. Why can a mixture like poha have components that are also mixtures?

Ans :

A mixture like poha can have components that are themselves mixtures because the definition of a mixture is broad, referring to any combination of two or more substances. For example, the poha dish contains spices, which are often mixtures of different ground seeds and herbs, and vegetables, which are complex biological mixtures of various compounds, all combined into one final dish.

NODIA

169. A student is asked to classify the substances in the table. Justify the classification for each substance, explaining why it is an element, compound, or mixture.

Substance	**Classification**
Gold	Element
Sugar ($C_{12}H_{22}O_{11}$)	Compound
Air	Mixture

Ans :

Gold is an element because it is a pure substance that cannot be broken down into anything simpler. Sugar is a compound because it is

Gold can hold these three classifications simultaneously due to its different defining characteristics.

- **Element** : Gold is classified as an element because it is a pure substance that cannot be broken down into anything simpler. It is made up of only one type of atom.
- **Metal** : It is classified as a metal based on its physical and chemical properties, such as being a good conductor of electricity, shiny, and malleable.
- **Mineral** : Gold is also classified as a native mineral because it is a naturally occurring, solid substance found on Earth with a fixed chemical composition (in this case, just the element gold itself).

180. Describe the evidence that suggests air is a mixture, including tests for its various components. [cite : 3612-3649]

Ans :

Air is proven to be a mixture through observations of its components and their properties.

- **Uniformity** : Air is a uniform mixture where its main gases like nitrogen and oxygen are evenly distributed and not visibly separate.
- **Retention of Properties** : The components retain their individual properties. Oxygen supports combustion, while nitrogen, the largest component, does not.
- **Test for Carbon Dioxide** : The presence of carbon dioxide can be confirmed by exposing lime water to the air; the lime water turns milky, indicating a chemical reaction with CO_2.
- **Presence of Water Vapour** : The condensation of water vapour from warm air onto a cool surface demonstrates its presence in the air mixture.
- **Presence of Dust** : Dust particles can be observed suspended in a beam of sunlight, showing that air also contains solid pollutants, further supporting its classification as a mixture.

181. What is the difference between physical and chemical changes in the context of separating substances? Use examples from the text.

Ans :

The distinction between physical and chemical changes is key to understanding how substances can be separated.

- **Physical Changes and Mixtures** : Mixtures can be separated by physical processes, which do not alter the chemical identity of the components. For example, in the iron and sulfur mixture (Sample A), a magnet is used to physically separate the iron filings from the sulfur without changing either substance. Evaporation is another physical process used to separate dissolved salt from water.
- **Chemical Changes and Compounds** : Compounds cannot be separated by physical means. They require a chemical change, or reaction, to break the chemical bonds between elements. For instance, water can only be broken down into hydrogen and oxygen through the chemical process of electrolysis, which fundamentally changes the water molecule.

182. Explain how the particulate nature of matter helps us understand the difference between uniform and non-uniform mixtures.

Ans :

The particulate nature of matter explains that all substances are made of tiny particles.

- **Uniform Mixtures** : In a uniform mixture, like sugar dissolved in water, the constituent particles of each substance are evenly distributed among each other at a microscopic level. The individual particles of sugar and water are so thoroughly mixed that they cannot be seen separately, even with a microscope, resulting in a single, consistent appearance.
- **Non-Uniform Mixtures** : In a non-uniform mixture, such as a sprout salad or muddy water, the components are not mixed at the particle level. Groups of particles (like a piece of tomato or a grain of sand) remain clustered together and are large enough to be visible, leading to a mixture where the different parts can be clearly distinguished.

CASE BASED QUESTIONS

183. A chef prepares a sprout salad by mixing green gram, chickpeas, chopped onion, and tomato. Each ingredient is clearly visible, and they do not react chemically with each other. A customer can easily pick out an ingredient they do not like.

Click Here to Buy book on Amazon

These substances are classified based on their composition and properties as follows:

- **Air** : Air is classified as a uniform mixture. It consists of different gases like nitrogen, oxygen, and carbon dioxide that are physically mixed but not chemically bonded. Each gas retains its own properties, and their proportions can vary slightly.
- **Water** : Water is classified as a compound. It is formed by the chemical combination of hydrogen and oxygen elements in a fixed 2:1 atomic ratio. Its properties are completely different from those of hydrogen and oxygen.
- **Stainless Steel** : Stainless steel is classified as a mixture, specifically a uniform mixture called an alloy. It is made by mixing iron with other elements like chromium and nickel, but the components are not chemically bonded and can be varied to change the steel's properties.

176. Detail the different types of matter and provide examples for each category.

Ans :

Matter can be broadly categorized into pure substances and mixtures, with further subdivisions.

Pure Substances:

These consist of only one type of particle and have a fixed composition.

- **Elements** : The simplest form of matter that cannot be broken down, such as iron, oxygen, and gold.
- **Compounds** : Formed from the chemical combination of two or more elements in a fixed ratio, like water (H_2O) and sodium chloride (NaCl).

Mixtures:

These consist of two or more substances that are physically mixed but not chemically combined.

- **Uniform Mixtures** : Components are evenly distributed and not visible, for example, air, seawater, and alloys like brass.
- **Non-Uniform Mixtures** : Components are not evenly distributed and are visible, such as a sprout salad or muddy water.

177. Imagine you have Sample A (iron-sulfur mixture) and Sample B (iron sulfide compound). How would you prove they are different?

Ans :

To prove Sample A and Sample B are different, a series of tests can be performed.

- **Visual Inspection** : Sample A is a non-uniform mixture where yellow sulfur particles and black iron filings are visible. Sample B is a uniform black mass with a consistent texture and color throughout.
- **Magnet Test** : When a magnet is brought near Sample A, the iron filings will be attracted and can be separated from the sulfur. The magnet will have no effect on Sample B, as the iron is chemically bonded and has lost its magnetic property.
- **Reaction with Acid** : Adding dilute hydrochloric acid to Sample A produces odourless hydrogen gas from the iron. Adding the same acid to Sample B produces hydrogen sulfide gas, which has a distinct rotten egg smell, indicating a new substance was formed.

178. Explain the role of elements, compounds, and mixtures in technology and innovation, using examples from the text.

Ans :

The understanding of elements, compounds, and mixtures is fundamental to technological innovation.

- **Elements** : Various elements like aluminium, copper, silicon, gold, and lithium are essential in manufacturing modern devices such as mobile phones, including their screens and batteries.
- **Compounds** : Chemists study how elements combine to create new compounds, leading to life-saving medicines and vaccines. This knowledge is also used to create fertilisers that improve agricultural output.
- **Mixtures** : Engineers and material scientists design innovative mixtures with unique properties. This includes developing alloys like stainless steel, which is stronger than pure iron, and advanced materials like graphene aerogel, the lightest material on Earth, used for environmental cleaning and energy-saving devices.

NODIA Download INDIA's Best Study app NODIA

179. Why can a single substance like gold be classified as an element, a metal, and a mineral simultaneously?

Ans :

187. A kitchen utensil is made of stainless steel. Although it is a solid, stainless steel is not an element but a special type of uniform mixture called an alloy. It is made by uniformly mixing iron, nickel, chromium, and a small amount of carbon. The components are mixed so evenly that they cannot be seen separately.

Questions:

1. What is a uniform mixture of two or more metals called?
2. Classify stainless steel as a uniform or non-uniform mixture and justify your answer.
3. Bronze is an alloy of copper and tin. How is an alloy like bronze different from a compound?

Ans :

1. It is called an alloy.
2. Stainless steel is a uniform mixture because its components are mixed so evenly that the entire mixture appears the same throughout, and individual substances cannot be seen.
3. An alloy is a mixture where components are not chemically bonded in a fixed ratio, and they retain some of their individual properties. A compound involves a chemical reaction, a fixed ratio, and results in a new substance with entirely different properties.

188. Air is essential for life and surrounds us everywhere. It is a uniform mixture composed mainly of nitrogen (about 78%) and oxygen (about 21%), along with small amounts of argon, carbon dioxide, and water vapor. Although made of different gases, its components are so evenly distributed that they cannot be distinguished, making it a solution of gases.

Questions:

1. What is the main component of air, making up about 78% of it?
2. Is air a uniform or non-uniform mixture? Explain why.
3. The dust particles are suspended in the air. Why are these dust particles considered pollutants and not an integral part of the air mixture?

Ans :

1. Nitrogen is the main component of air.
2. Air is a uniform mixture because its component gases are evenly distributed and cannot be seen separately.
3. Dust particles are considered pollutants because they are not an integral part of air's gaseous composition, and their amount varies from time to time and place to place.

189. A student gently heats a teaspoon of sugar in a boiling tube. The sugar first turns brown and then chars, becoming a blackish substance, which is carbon. She also observes small droplets of water forming near the open end of the tube. This experiment shows that sugar can be broken down into simpler substances like carbon and water.

Questions:

1. What two substances are produced when sugar is decomposed by heating?
2. Based on the results of this experiment, can sugar be classified as an element? Why or why not?
3. Since water is composed of hydrogen and oxygen, what three elements make up the compound sugar?

Ans :

1. Carbon and water are produced when sugar is heated.
2. No, sugar cannot be an element because it can be broken down into simpler substances (carbon and water).
3. The three elements that make up sugar are carbon, hydrogen, and oxygen.

190. A geologist explains that gold is a very special substance. It is an element because it is a pure substance that cannot be broken down into anything simpler. At the same time, it is also classified as a native mineral because it is a naturally occurring solid substance found on Earth that is a pure element and not a compound.

Questions:

1. What is the definition of an element?
2. Why is gold classified as a "native mineral"?
3. Most minerals, like quartz and calcite, are compounds. How is a native mineral like gold different from a mineral like quartz?

Ans :

1. An element is a substance that cannot be further broken down into simpler substances.
2. Gold is a native mineral because it is a mineral that exists as a pure element, not as a compound.
3. A native mineral like gold consists of a single pure element. A mineral like quartz is a compound made up of more than one element chemically combined.

Downloaded from www.pdf.tube

Ans :

(A) A solution
A solution is a specific type of mixture where the components are evenly distributed and cannot be distinguished from one another, even with a microscope. This uniformity is why every sip of a well-made salt solution tastes the same.

14. In a solution of sugar and water, what is the sugar component called?
(A) Solvent
(B) Solute
(C) Solution
(D) Mixture

Ans :

(B) Solute
The solute is the substance that dissolves in another substance to form a solution. In the case of a solid dissolving in a liquid, the solid component, such as sugar or salt, is always considered the solute.

15. For most solid substances like baking soda, how does solubility in water change when the temperature is increased?
(A) It decreases.
(B) It remains the same.
(C) It increases.
(D) It becomes zero.

Ans :

(C) It increases.
For the majority of solid solutes, increasing the temperature of the solvent increases the kinetic energy of the particles. This allows the solvent to dissolve more solute, thus increasing the substance's solubility.

16. How does the solubility of gases in water, such as oxygen, generally change as the temperature increases?
(A) It increases.
(B) It remains constant.
(C) It becomes infinite.
(D) It decreases.

Ans :

(D) It decreases.
Unlike most solids, the solubility of gases in liquids decreases as the temperature rises. This is because the higher temperature gives the dissolved gas particles more energy, allowing them to escape from the solution more easily.

17. What is a solution called when it cannot dissolve any more solute at a given temperature?
(A) Saturated
(B) Unsaturated
(C) Dilute
(D) Concentrated

Ans :

(A) Saturated
A solution becomes saturated when it has reached the maximum amount of solute that can be dissolved in the solvent at that specific temperature. Any further addition of solute will not dissolve and will settle at the bottom.

18. How does a dilute solution differ from a concentrated solution?
(A) A dilute solution has much more solute than a concentrated solution.
(B) A dilute solution has less solute in a fixed amount of solvent.
(C) A dilute solution is always considered to be a saturated solution.
(D) A concentrated solution is always considered to be unsaturated.

Ans :

(B) A dilute solution has less solute in a fixed amount of solvent.
The terms 'dilute' and 'concentrated' are relative and describe the amount of solute present. A solution with a low proportion of solute is considered dilute, while one with a high proportion of solute is considered concentrated.

19. Why is the presence of dissolved oxygen in cold water crucial for aquatic life?
(A) Cold water has less dissolved oxygen, so fish must adapt to it.
(B) Oxygen will only dissolve in water that is about to start freezing.
(C) More oxygen can dissolve in cold water, supplying aquatic life.
(D) The amount of dissolved oxygen has no impact on any aquatic life.

Ans :

(C) More oxygen can dissolve in cold water, supplying aquatic life.
The solubility of gases like oxygen is higher in colder water. This ensures that there is enough dissolved oxygen available for fish and other aquatic creatures to carry out respiration, especially in colder climates or deeper water.

NODIA

durable, or having a different appearance (like a shiny golden color) than the pure metals they are made from.

195. Material scientists have developed an extremely light material called graphene aerogel, which is made from the element carbon. It is so light that a piece of it can be held up by blades of grass. Because it is highly porous, it has a very high absorbing capacity, making it potentially useful as an environmental cleaner for oil spills.

Questions:

1. What element is graphene aerogel made from?
2. What property of graphene aerogel makes it potentially useful for cleaning up oil spills?
3. The text states this material was "developed by material scientists." How does this relate to the chapter's idea that understanding elements, compounds, and mixtures is the key to innovation?

Ans :

1. Graphene aerogel is made from carbon.
2. It is highly porous and has a high absorbing capacity, which could be used to absorb oil.
3. This shows how scientists study elements (like carbon) and design materials with unique properties to solve real-world problems like pollution, which is a key theme of innovation mentioned in the chapter.

196. A teacher asks students to classify several substances. They identify gold as an element because it cannot be broken down further. They classify carbon dioxide as a compound because it's made of carbon and oxygen chemically combined in a fixed ratio. Finally, they classify seawater as a mixture because it contains water, dissolved salts, and other substances that are not chemically bonded.

Questions:

1. Why is carbon dioxide classified as a compound and not an element?
2. Why is seawater classified as a mixture and not a pure substance?
3. If the salt from seawater is separated by evaporation, is this a physical or a chemical process? Does this support its classification as a mixture?

Ans :

1. Carbon dioxide is a compound because it is composed of two or more elements (carbon and oxygen) combined chemically in a fixed ratio.
2. Seawater is a mixture because it is made up of two or more substances (water, salt, etc.) mixed together, where each substance retains its properties.
3. Evaporation is a physical process. Yes, this supports its classification as a mixture because the constituent components of a mixture can be separated by physical methods.

197. Quartz is a very common mineral found in rocks. It is not a pure element but a compound made up of two elements : silicon and oxygen, chemically bonded together. This versatile mineral is a key component in many everyday products. For example, cement is made from a mixture of minerals including calcite and quartz, and it is used to construct buildings.

Questions:

1. Are most minerals pure elements or compounds?
2. Is quartz an element, compound, or mixture?
3. The cement is made from calcite, quartz, and other minerals. Based on this, would you classify cement as a pure substance or a mixture? Explain.

Ans :

1. Most minerals are compounds made up of more than one element.
2. Quartz is a compound.
3. Cement would be classified as a mixture because it is made from different minerals (calcite, quartz, etc.) that are mixed together.

****

Click Here to Buy book on Amazon

CHAPTER 9

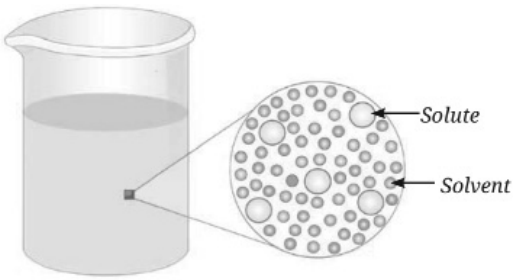
THE AMAZING WORLD OF SOLUTES, SOLVENTS AND SOLUTIONS

SUMMARY

1. SOLUTIONS : UNIFORM MIXTURES

1.1 Solutes, Solvents and Solutions

1. A solutionis a uniform mixture where two or more substances are mixed so evenly that they cannot be distinguished from one another.
2. The substance that dissolves is called the solute.
3. The substance that does the dissolving is called the solvent.
4. The basic formula is : Solute + Solvent → Solution.
5. In a solution of two liquids, the one present in the larger amount is the solvent.
6. Solutions can also be gaseous. Air is a solution where nitrogen is the solvent and other gases like oxygen are the solutes.



Magnified schematic picture of a solute evenly distributed in a solvent

2. SOLUBILITY AND CONCENTRATION

2.1 Saturated and Unsaturated Solutions

1. Unsaturated Solution : A solution in which more solute can still be dissolved at a given temperature.
2. Saturated Solution : A solution that has reached its limit and cannot dissolve any more solute at that particular temperature. Any extra solute added will settle at the bottom.
3. Concentration refers to the amount of solute present in a solution.
4. A dilute solution has a relatively small amount of solute.
5. A concentrated solution has a relatively large amount of solute.

NODIA

2.2 Solubility

Solubility is the maximum amount of a solute that can dissolve in a fixed quantity of a solvent at a specific temperature.

2.3 Effect of Temperature on Solubility

1. Solids in Liquids : For most solid solutes, solubility increases as the temperature of the solvent increases. This means you can dissolve more solid in a hot liquid than in a cold one.
2. Gases in Liquids : The solubility of gases in liquids generally decreases as the temperature increases. This is why cold water can hold more dissolved oxygen than warm water, which is essential for aquatic life.

3. DENSITY : A KEY PROPERTY OF MATTER

3.1 What is Density?

Density is defined as the mass of a substance per unit volume. The formula for density is:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

The SI unit for density is kilograms per cubic metre (kg/m^3). Other common units are grams per millilitre (g/mL) or grams per cubic centimetre (g/cm^3).

3.2 Floating and Sinking

Whether an object floats or sinks in a liquid is related to its density compared to the liquid's density.

1. An object that is less dense than water (like oil or a wooden log) will float.
2. An object that is more dense than water (like an iron rod) will sink.
3. Ice float on water because it is less dense. When water freezes, its particles arrange in a structure that takes up more space, increasing its volume and decreasing its density.

3.3 How Temperature and Pressure Affect Density

1. Temperature : Generally, when a substance is heated, its volume increases while its mass stays the same, causing its density to decrease. This is why hot air is less dense and rises.
2. Pressure : For gases, increasing pressure pushes the particles closer together, decreasing the volume and increasing the density.

   For liquids and solids, which are nearly incompressible, pressure has a very small effect on density.

4. MEASURING MASS AND VOLUME TO FIND DENSITY

To calculate the density of an object, you need to measure its mass and volume.

4.1 Measuring Mass

Mass is the amount of matter in an object. It is measured using an instrument called a balance(e.g., a digital weighing balance).

4.2 Measuring Volume

Volume is the amount of space an object occupies. For Liquids : Volume is measured using a measuring cylinder. For Regularly Shaped Solids : Volume can be calculated with a formula. For a cuboid : Volume = length × width × height.
For Irregularly Shaped Solids : Volume is measured using the water displacement method. The object is submerged in a measuring cylinder filled with water, and the rise in the water level is equal to the object's volume.

NODIA

NCERT EXERCISE

1. State whether the statements given below are True [T] or False [F]. Correct the false statement(s).

(i) Oxygen gas is more soluble in hot water rather than in cold water.
(ii) A mixture of sand and water is a solution.
(iii) The amount of space occupied by any object is called its mass.
(iv) An unsaturated solution has more solute dissolved than a saturated solution.
(v) The mixture of different gases in the atmosphere is also a solution.

Ans :

(i) False. The solubility of gases in liquids generally decreases as the temperature increases. Therefore, oxygen gas is more soluble in cold water than in hot water.
(ii) False. A mixture of sand and water is a non-uniform mixture, not a solution, because the components are not evenly distributed.
(iii) False. The amount of space occupied by any object is called its volume.
(iv) False. A saturated solution has more solute dissolved than an unsaturated solution at a given temperature. An unsaturated solution can still dissolve more solute.
(v) True.

2. Fill in the blanks.

(i) The volume of a solid can be measured by the method of _____ displacement, where the solid is _____ in water and the _____ in water level is measured.
(ii) The maximum amount of _____ dissolved in _____ at a particular temperature is called _____ at that temperature.
(iii) Generally, the density _____ with increase in temperature.
(iv) The solution in which glucose has completely dissolved in water, and no more glucose can dissolve at a given temperature, is called a _____ solution of glucose.

Ans :

(i) The volume of a solid can be measured by the method of water displacement, where the solid is immersed in water and the rise in water level is measured.
(ii) The maximum amount of solute dissolved in a fixed quantity of a solvent at a particular

191. To demonstrate the presence of carbon dioxide in the air, a student prepares lime water (a solution of calcium hydroxide) and leaves it in an open petri dish. After a few hours, she observes that the clear lime water has turned milky. This change indicates a chemical reaction between calcium hydroxide and carbon dioxide from the air.

Questions:

1. What is the chemical name for lime water?
2. Why did the lime water turn milky when exposed to air?
3. This activity proves the presence of which gas in the air?

Ans :

1. Lime water is a solution of calcium hydroxide.
2. The lime water turned milky because the calcium hydroxide reacted with carbon dioxide from the air to form calcium carbonate, which appears as insoluble tiny white particles.
3. This activity demonstrates the presence of carbon dioxide in the air.

192. A science describes how sodium, a soft metal, reacts with chlorine, a hazardous gas. The result is a harmless, taste-enhancing substance essential for life : sodium chloride, or common salt. The particles of sodium and chlorine combine chemically in a fixed 1:1 ratio to form this new substance, whose properties are drastically different from its constituent elements.

Questions:

1. What two elements combine to form the compound sodium chloride?
2. Is it possible to separate sodium and chlorine from salt using a physical process like evaporation?
3. How does this example demonstrate that the properties of a compound are different from those of its constituent elements?

Ans :

1. Sodium and chlorine combine to form sodium chloride.
2. No, the constituent elements of a compound cannot be separated by any physical method.
3. A soft metal (sodium) and a hazardous gas (chlorine) combine to form a harmless and essential solid (salt), showing that the compound's properties are entirely new and different from its elements.

Download INDIA's Best Study app NODIA

193. A student is making lemonade. She adds sugar and lemon juice to water and stirs until everything dissolves completely. She cannot see the individual sugar or lemon particles anymore. The resulting liquid is clear and tastes the same throughout. This process has created a uniform mixture, which in scientific terms is called a solution, with water acting as the solvent.

Questions:

1. Why is the lemonade classified as a uniform mixture?
2. In a solution of sugar and water, which substance is the solute and which is the solvent?
3. If the student had added sand to the water instead, it would be a non-uniform mixture. Why?

Ans :

1. It is a uniform mixture because the components are evenly distributed and cannot be distinguished from one another.
2. Sugar is the solute, and water is the solvent (as solids dissolved in liquids).
3. It would be a non-uniform mixture because sand does not dissolve, and its different components would be clearly visible with the naked eye.

194. An artist practices Dhokra art, an ancient craft that uses alloys. To create a figure, she fills a hollow clay mould with molten brass (a mixture of copper and zinc) or bronze (a mixture of copper and tin). These alloys are strong and have a shiny golden color, properties distinct from their constituent metals, making them ideal for creating beautiful figures.

Questions:

1. Name two examples of alloys mentioned in the case study.
2. Is brass an element, compound, or mixture? Explain your choice.
3. Why are alloys like brass and bronze used in art and for making utensils instead of their pure constituent metals like copper or tin?

Ans :

1. Two alloys mentioned are brass and bronze.
2. Brass is a mixture (specifically, an alloy) because it is made of two or more metals mixed together that have properties distinct from its constituent metals.
3. Alloys are often used because they have unique properties, such as being stronger, more

Downloaded from www.pdf.tube

Ans :

The unpeeled orange floats because its peel is porous and contains many small air pockets. These air pockets increase the overall volume of the orange without adding much mass. This makes the average density of the unpeeled orange less than the density of water, causing it to float. When the peel is removed, the orange loses the extra volume provided by the air pockets. The peeled orange is now denser than water, so it sinks.

9. Object A has a mass of 200 g and a volume of 40 cm^3. Object B has a mass of 240 g and a volume of 60 cm^3. Which object is denser?

Ans :

First, calculate the density of each object.

Density of Object A:

$$\text{Density}_A = \frac{\text{Mass}_A}{\text{Volume}_A}$$

$$= \frac{200\ \text{g}}{40\ \text{cm}^3} = 5\ \text{g/cm}^3$$

Density of Object B:

$$\text{Density}_B = \frac{\text{Mass}_B}{\text{Volume}_B}$$

$$= \frac{240\ \text{g}}{60\ \text{cm}^3} = 4\ \text{g/cm}^3$$

Comparing the two densities, $5\ \text{g/cm}^3 > 4\ \text{g/cm}^3$. Therefore, Object A is denser than Object B.

10. Reema has a piece of modeling clay that weighs 120 g. She first moulds it into a compact cube that has a volume of 60 cm^3. Later, she flattens it into a thin sheet. Predict what will happen to its density.

Ans :

The density of the modeling clay will remain the same. Density is an intrinsic property of a substance and is defined as mass per unit volume (Density = Mass / Volume). Changing the shape of the clay from a cube to a thin sheet does not change its mass (120 g) or the volume of the material itself. Therefore, its density does not change.

11. A block of iron has a mass of 600 g and a density of 7.9 g/cm^3. What is its volume?

Ans :

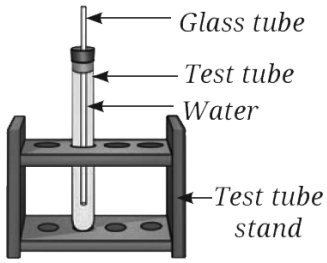
From the formula for density, we can find the volume:

$$\text{Volume} = \frac{\text{Mass}}{\text{Density}}$$

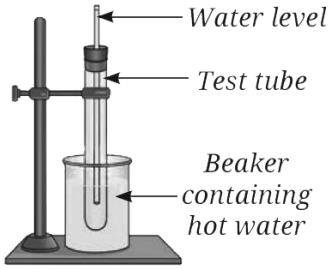
$$\text{Volume} = \frac{600\ \text{g}}{7.9\ \text{g/cm}^3} \approx 75.95\ \text{cm}^3$$

The volume of the iron block is approximately 75.95 cm^3.

12. You are provided with an experimental setup as shown in Figure (a) and (b). On keeping the test tube (Fig b) in a beaker containing hot water ($\sim 70^\circ$C), the water level in the glass tube rises. How does it affect the density?



(a)



(b)

Ans :

When the test tube is placed in hot water, the water inside it gets heated. This causes the particles of water to move away from each other, resulting in an increase in its volume. The rise in the water level in the glass tube is evidence of this volume expansion. Since density is calculated as mass divided by volume (Density = Mass/ Volume), and the mass of the water remains constant while its volume increases, the density of the water decreases.

MULTIPLE CHOICE QUESTION

13. What is a uniform mixture, such as salt or sugar completely mixed in water, called?

(A) A solution
(B) A non-uniform mixture
(C) A solute
(D) A solvent

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

temperature is called solubility at that temperature.
(iii) Generally, the density decreases with increase in temperature.
(iv) The solution in which glucose has completely dissolved in water, and no more glucose can dissolve at a given temperature, is called a saturated solution of glucose.

3. You pour oil into a glass containing some water. The oil floats on top. What does this tell you?
(i) Oil is denser than water
(ii) Water is denser than oil
(iii) Oil and water have the same density
(iv) Oil dissolves in water

Ans :

(ii) Water is denser than oil.
Objects that are less dense than a liquid will float on it.

4. A stone sculpture weighs 225 g and has a volume of 90 cm^3. Calculate its density and predict whether it will float or sink in water.

Ans :

To find the density, we use the formula:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Given:

Mass $= 225$ g

Volume $= 90\ cm^3$

$$\text{Density} = \frac{225\ g}{90\ cm^3} = 2.5\ g/cm^3$$

The density of the stone sculpture is $2.5\ g/cm^3$. Since the density of water is approximately $1\ g/cm^3$, the sculpture is denser than water. Therefore, the stone sculpture will sink in water.

5. Which one of the following is the most appropriate statement, and why are the other statements not appropriate?
(i) A saturated solution can still dissolve more solute at a given temperature.
(ii) An unsaturated solution has dissolved the maximum amount of solute possible at a given temperature.
(iii) No more solute can be dissolved into the saturated solution at that temperature.
(iv) A saturated solution forms only at high temperatures.

Ans :

Statement (iii) is the most appropriate.

Reason : A saturated solution is defined as a solution in which the maximum amount of solute has been dissolved at a particular temperature, and no more can be dissolved.
Statement (i) is incorrect because it describes an unsaturated solution.
Statement (ii) is incorrect because it defines a saturated solution, not an unsaturated one.
Statement (iv) is incorrect because saturated solutions can be formed at any temperature; the temperature only affects the amount of solute required to achieve saturation.

6. You have a bottle with a volume of 2 litres. You pour 500 mL of water into it. How much more water can the bottle hold?

Ans :

First, convert the volume of the bottle to millilitres (mL).
1 litre = 1000 mL So, 2 litres = 2000 mL
To find how much more water the bottle can hold, subtract the volume of water poured from the total volume of the bottle.
Remaining capacity = Total volume – Poured volume Remaining capacity = 2000 mL – 500 mL = 1500 mL The bottle can hold 1500 mL more water.

7. An object has a mass of 400 g and a volume of 40 cm^3. What is its density?

Ans :

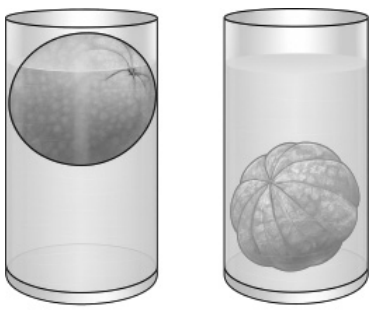
Using the formula for density:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Density} = \frac{400\ g}{40\ cm^3} = 10\ g/cm^3$$

The density of the object is $10\ g/cm^3$.

8. Analyses Figure (a) and (b). Why does the unpeeled orange float, while the peeled one sinks? Explain.



(a) (b)

Click Here to Buy book on Amazon

20. How is the density of a substance defined?
(A) The volume of the substance divided by its mass.
(B) The total weight of the substance.
(C) The space occupied by the substance.
(D) The mass of the substance divided by its volume.

Ans :

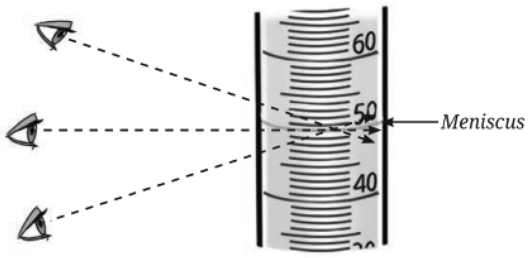
(D) The mass of the substance divided by its volume.
Density is an intrinsic property of a substance that describes how much matter is packed into a given space. It is calculated by the formula : Density = Mass/Volume.

21. How is the volume of an irregularly shaped object like a stone typically measured?
(A) By carefully measuring its mass on a digital or pan balance.
(B) By using the water displacement method with a measuring cylinder.
(C) By using the geometric formula length × width × height.
(D) By simply estimating its overall size by sight.

Ans :

(B) By using the water displacement method with a measuring cylinder.
For objects without a regular geometric shape, the volume is found by immersing the object in a known volume of water in a measuring cylinder. The volume of the object is equal to the rise in the water level.

22. When reading the volume of water in a measuring cylinder as shown in figure, where should your eye level be?



Measuring the reading

(A) Positioned at an angle above the curved surface (meniscus).
(B) Positioned at an angle below the curved surface (meniscus).
(C) At the same level as the bottom of the curved surface (meniscus).
(D) It does not matter where your eye level is positioned for a reading.

Ans :

(C) At the same level as the bottom of the curved surface (meniscus).
To avoid parallax error and get an accurate reading, your eye must be positioned directly level with the surface of the liquid. For water and other colorless liquids, the reading is taken from the bottom of the curved meniscus.

NODIA

23. What is the SI unit of density?
(A) Kilogram per cubic metre (kg/m^3)
(B) Gram per millilitre (g/mL)
(C) Newton per metre (N/m)
(D) Kilogram (kg)

Ans :

(A) Kilogram per cubic metre (kg/m^3)
The Standard International (SI) system of units uses the kilogram (kg) for mass and the cubic metre (m^3) for volume. Therefore, the derived SI unit for density is kilograms per cubic metre.

24. Why does an iron nail sink in water while a large wooden log floats?
(A) The iron nail is significantly heavier than the large wooden log.
(B) The wood contains a large amount of air, which makes it float.
(C) The iron nail is highly magnetic, which causes it to sink.
(D) The iron nail is denser than water; the wood is less dense.

Ans :

(D) The iron nail is denser than water; the wood is less dense.
An object's ability to float or sink is determined by its density relative to the liquid. Iron has a much higher density than water, so it sinks. Wood has a lower density than water, so it floats.

25. Why does a hot air balloon rise?
(A) Heating the air inside makes it less dense than the cooler air.
(B) The fabric material of the balloon is much lighter than air.
(C) The fire inside the hot air balloon pushes it directly upwards.
(D) The wind and air currents push the entire balloon upwards.

Ans :

(A) Heating the air inside makes it less dense than the cooler air.
When air is heated, it expands, meaning the same mass of air occupies a larger volume. This results in a decrease in density. The less dense hot air inside the balloon rises through the cooler, denser air outside, creating lift.

26. What is the term for the substance present in a larger amount in a solution formed by mixing two liquids?
(A) Solute
(B) Solvent
(C) Mixture
(D) Precipitate

Ans :

(B) Solvent
When two liquids are mixed to form a solution, the substance present in the greater quantity is designated as the solvent, and the one in the smaller quantity is the solute.

27. Which of the following statements about mass is incorrect?
(A) It is the quantity of matter present in an object.
(B) Its SI unit is the kilogram (kg).
(C) It changes depending on the object's location (e.g., on Earth vs. on the Moon).
(D) It is measured using a balance.

Ans :

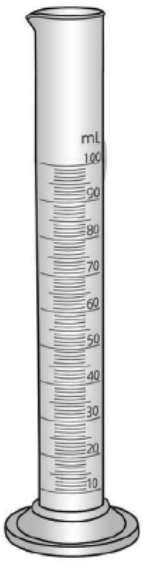
(C) It changes depending on the object's location (e.g., on Earth vs. on the Moon).
Mass is an intrinsic property of an object and is constant regardless of location. It is the weight of an object (the force of gravity on it) that changes depending on the gravitational field of the location.

28. An object has a mass of 100 g and a volume of 20 cm^3. What is its density?
(A) 0.2 g/cm^3
(B) 120 g/cm^3
(C) 2000 g/cm^3
(D) 5 g/cm^3

Ans :

(D) 5 g/cm^3
Density is calculated by dividing mass by volume. In this case, Density = 100 g / 20 cm^3 = 5 g/cm^3. This means each cubic centimeter of the object's volume contains 5 grams of mass.

29. A student observes a measuring cylinder like the one in Figure The marks are from 0 to 100 mL. There are 10 small divisions between the 10 mL mark and the 20 mL mark. What is the smallest volume the cylinder can accurately measure (its least count)?



(A) 1 mL
(B) 10 mL
(C) 5 mL
(D) 2 mL

Ans :

(A) 1 mL
The volume difference between the two major marks is 20 mL – 10 mL = 10 mL. Since there are 10 small divisions within this range, the value of one small division is 10 mL / 10 divisions = 1 mL.

30. Mass is to kilogram as volume is to _____.
(A) Newton (B) Cubic metre
(C) Pascal (D) Gram

Ans :

(B) Cubic metre
This analogy relates a physical quantity to its SI unit. The SI unit for mass is the kilogram. The SI unit for volume, which is the space occupied by an object, is the cubic metre.

31. In air, which gas is considered the solvent because it is present in the largest amount?
(A) Oxygen (B) Carbon dioxide
(C) Nitrogen (D) Argon

Ans :

(C) Nitrogen

Downloaded from www.pdf.tube

Air is a gaseous solution. Since nitrogen makes up about 78% of the air, it is the most abundant component and is therefore considered the solvent. All other gases, like oxygen, are considered solutes.

32. A student adds salt to a glass of water and stirs. The salt dissolves. The resulting liquid is a(n) _____.
(A) Non-uniform mixture
(B) Saturated solute
(C) Dense solvent
(D) Unsaturated solution

Ans :

(D) Unsaturated solution
As long as the added solute (salt) completely dissolves in the solvent (water), the solution is considered unsaturated. This means it still has the capacity to dissolve more solute at that temperature.

33. What is the scientific reason that ice floats on liquid water?
(A) Water expands when it freezes, making ice less dense.
(B) The solid state of a substance is always lighter than its liquid state.
(C) Ice is able to trap a lot of air bubbles, which makes it float.
(D) The temperature of the ice is much lower than that of the water.

Ans :

(A) Water expands when it freezes, making ice less dense.
Water exhibits an unusual property where its solid form (ice) is less dense than its liquid form. This is because the water molecules form a crystal lattice structure upon freezing, which takes up more volume, causing the ice to float.

34. What is the term for the curved upper surface of a liquid in a tube?
(A) Level
(B) Meniscus
(C) Volume
(D) Mark

Ans :

(B) Meniscus
Due to forces between the liquid and the container (adhesion) and within the liquid itself (cohesion), the surface of a liquid in a narrow tube forms a curve. This curved surface is called the meniscus.

35. Density is defined as _____ per unit _____.
(A) Volume, mass
(B) Weight, mass
(C) Mass, volume
(D) Mass, area

Ans :

(C) Mass, volume
The definition of density is a ratio that relates the amount of matter in an object to the space it occupies. Specifically, it is the amount of mass contained within a single unit of volume (e.g., one cubic centimeter or one cubic meter).

NODIA

36. Which of the following statements about density is incorrect?
(A) It is calculated as Mass/Volume.
(B) It is independent of the object's shape or size.
(C) Its SI unit is kg/m^3.
(D) It generally increases when a substance is heated.

Ans :

(D) It generally increases when a substance is heated.
Generally, when a substance is heated, it expands, meaning its volume increases while its mass stays the same. Since Density = Mass/Volume, an increase in volume leads to a decrease in density.

37. An unopened can of regular soda sinks in water, but an unopened can of diet soda floats. What is the most likely reason for this?
(A) Regular soda is denser than water; diet soda is less dense.
(B) The can of diet soda contains a larger amount of gas.
(C) The metal used for the diet soda can is significantly lighter.
(D) Regular soda is a fully saturated and concentrated solution.

Ans :

(A) Regular soda is denser than water; diet soda is less dense.
The dissolved sugar in regular soda adds significant mass without much change in volume, making its overall density greater than water. Diet soda uses low-mass sweeteners, so its overall density remains less than that of water, allowing it to float.

Download INDIA's Best Study app NODIA

A saturated solution cannot dissolve more solute, while an unsaturated solution can. Dilute and concentrated are relative terms describing the amount of solute in a solution.

85. Match the concept of solubility with its corresponding characteristic.

	Column A		**Column B**
1	Solubility	A	The solubility of this state of matter in a liquid generally increases as the temperature rises.
2	Solid Solute	B	The reason aquatic animals survive better in cold water, which holds more dissolved oxygen.
3	Gaseous Solute	C	The maximum amount of a solute that can be dissolved in a fixed quantity of a solvent at a particular temperature.
4	Aquatic Life	D	The solubility of this state of matter in a liquid generally decreases as the temperature rises.

Options
(a) 1-D, 2-B, 3-A, 4-C
(b) 1-A, 2-C, 3-D, 4-B
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-D, 3-C, 4-A

Ans :

(c) 1-C, 2-A, 3-D, 4-B
Solubility is the maximum amount of solute that can dissolve at a specific temperature. The solubility of most solids increases with temperature, while that of gases decreases. Aquatic life depends on the higher solubility of oxygen in colder water.

86. Match the physical property or measurement tool with its definition.

	Column A		**Column B**
1	Density	A	The amount of matter in an object, measured with a balance.
2	Mass	B	An instrument used to measure the volume of a liquid or an irregular solid.
3	Volume	C	The space occupied by an object.
4	Measuring Cylinder	D	The mass of a substance per unit volume.

Options
(a) 1-C, 2-B, 3-A, 4-D
(b) 1-B, 2-D, 3-C, 4-A
(c) 1-A, 2-C, 3-D, 4-B
(d) 1-D, 2-A, 3-C, 4-B

Ans :

(d) 1-D, 2-A, 3-C, 4-B
Density is mass per unit volume. Mass is the amount of matter. Volume is the space occupied. A measuring cylinder is used to measure volume.

Download INDIA's Best Study app NODIA

87. Match the principle or method with its correct application or description.

	Column A		**Column B**
1	Floating Object	A	A method used to find the volume of an irregularly shaped solid.
2	Sinking Object	B	An object that is denser than the liquid it is placed in.
3	Water Displacement	C	This process causes a substance's volume to increase and its density to decrease.
4	Effect of heating on density	D	An object that is less dense than the liquid it is placed in.

Options
(a) 1-D, 2-B, 3-A, 4-C
(b) 1-C, 2-A, 3-D, 4-B
(c) 1-B, 2-D, 3-C, 4-A
(d) 1-A, 2-C, 3-B, 4-D

Ans :

(a) 1-D, 2-B, 3-A, 4-C
An object floats if it is less dense than the liquid. It sinks if it is denser. Water displacement measures the volume of irregular objects. Heating generally decreases a substance's density.

Click Here to Buy book on Amazon

Ans :

(C) Crust

The Earth is structured in layers based on density. The crust is the outermost and least dense layer. As one moves deeper through the mantle and into the core, the materials become progressively denser due to composition and immense pressure.

44. Relative density is the ratio of the density of a substance to the density of _____.

(A) Air (B) Iron
(C) Oil (D) Water

Ans :

(D) Water

Relative density is a dimensionless quantity that compares the density of a substance to a standard reference substance. For solids and liquids, the standard reference is almost always water at a specified temperature (usually 4°C).

45. To measure 70 mL of water accurately in a single step, which measuring cylinder would be the best choice?

(A) 100 mL measuring cylinder
(B) 10 mL measuring cylinder
(C) 50 mL measuring cylinder
(D) 500 mL measuring cylinder

Ans :

(A) 100 mL measuring cylinder

The best instrument for a measurement is one where the value falls well within its range and which has appropriate precision. A 100 mL cylinder can measure 70 mL in one go and is more precise than a 500 mL one for this volume.

46. Which of the following is an INCORRECT statement about solutions?

(A) Air is a common type of gaseous solution.
(B) A mixture of sand and water is a solution.
(C) A uniform mixture of salt and water is a solution.
(D) The components of a solution are evenly distributed.

Ans :

(B) A mixture of sand and water is a solution.

A solution is a uniform (homogeneous) mixture. A mixture of sand and water is non-uniform (heterogeneous) because the sand does not dissolve and its particles are not evenly distributed, making it not a solution.

47. When making sugar syrup (Chashni) for sweets, a large amount of sugar is dissolved in a small amount of water. Even so, water is still considered the solvent. Why?

(A) Because sugar is a solid and not another liquid component.
(B) Because sugar is known to be much sweeter than plain water.
(C) Because water is the substance that is doing the dissolving.
(D) Because the entire solution is heated to a high temperature.

Ans :

(C) Because water is the substance that is doing the dissolving.

In a solid-in-liquid solution, the liquid component is generally considered the solvent, regardless of the relative amounts. This is because the liquid provides the medium in which the solid dissolves.

48. Asima Chatterjee, a renowned Indian scientist, was known for her work in developing anti-epileptic and anti-malarial drugs by extracting compounds from _____.

(A) Minerals and rocks
(B) Aquatic animals
(C) Synthetic chemicals
(D) Medicinal plants

Ans :

(D) Medicinal plants

Dr. Asima Chatterjee was a pioneer in phytochemistry. She extensively used solvents and solution chemistry to extract, isolate, and study active compounds from various Indian medicinal plants, leading to the development of important drugs.

49. A saturated solution is to maximum solute as a(n) _____ solution is to less than maximum solute.

(A) Unsaturated (B) Concentrated
(C) Dilute (D) Solvent

Ans :

(A) Unsaturated

This analogy defines solutions based on their capacity to dissolve solute. A saturated solution holds the maximum possible amount of solute. An unsaturated solution contains less than the maximum and therefore has the capacity to dissolve more.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

38. Pressure has a significant effect on the density of gases but a negligible effect on solids and liquids. Why?
(A) Because gases are generally much lighter than solids and liquids.
(B) Because gas particles are far apart and can be easily compressed.
(C) Because gas particles do not have any measurable mass or weight.
(D) Because gas particles do not move around in the container.

Ans :

(B) Because gas particles are far apart and can be easily compressed.
The large interparticle spaces in gases allow them to be easily compressed, which forces the particles closer together and increases the density. Solids and liquids are already tightly packed, so pressure has little effect on their volume and density.

39. How does a digital weighing balance differ from a two-pan balance?
(A) A digital balance is for volume, while a two-pan balance is for mass.
(B) A digital balance is less accurate than a traditional two-pan balance.
(C) A digital balance displays mass, while a two-pan balance compares masses.
(D) A digital balance uses springs, while a two-pan balance uses magnets.

Ans :

(C) A digital balance displays mass, while a two-pan balance compares masses.
A digital balance measures the downward force (weight) and uses a built-in calibration to display the corresponding mass. A traditional two-pan balance works by directly comparing the unknown mass with known masses until they balance.

40. If an oil packet is labeled as 1 litre (volume) and 910 grams (mass), what does this tell you about the density of the oil compared to water?
(A) The oil is denser than water.
(B) The oil has the same density as water.
(C) Density cannot be determined from this information.
(D) The oil is less dense than water.

Ans :

(D) The oil is less dense than water.
One litre of water has a mass of approximately 1000 grams. Since one litre of this oil has a mass of only 910 grams, the oil is less dense than water, which is why it would float on water.

41. The instrument used to measure the mass of an object is known as a _____.
(A) Balance
(B) Measuring cylinder
(C) Thermometer
(D) Barometer

Ans :

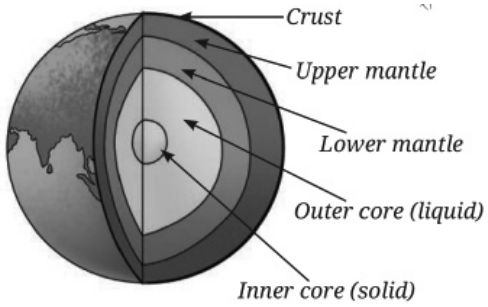
(A) Balance
A balance is a device designed to measure mass. It works either by comparing the object's mass to known masses (like a two-pan balance) or by measuring the force of gravity on it and converting that to a mass reading (like a digital balance).

42. A solution is made by dissolving one spoon of salt in 100 mL of water. If you take one sip from the top and one sip from the bottom, they taste the same. This demonstrates that a solution is a _____.
(A) Non-uniform mixture
(B) Uniform mixture
(C) Saturated mixture
(D) Solid mixture

Ans :

(B) Uniform mixture
The uniform taste throughout the solution indicates that the salt particles (solute) are evenly and completely distributed among the water particles (solvent). This homogeneous composition is the defining characteristic of a solution.

43. In the diagram of the Earth's layers , the density of the different layers increases as we move towards the center. The outermost, lightest layer is called the _____.



(A) Outer core
(B) Inner core
(C) Crust
(D) Mantle

NODIA

56. How does the effect of pressure on the density of a gas compare to its effect on a liquid?
(A) Pressure affects the density of liquids much more than gases.
(B) Pressure affects the density of both gases and liquids equally.
(C) Pressure does not affect the density of either gases or liquids.
(D) Pressure significantly affects gas density but not liquid density.

Ans :

(D) Pressure significantly affects gas density but not liquid density.
Gases are highly compressible due to large interparticle spaces, so increasing pressure significantly increases their density. Liquids are nearly incompressible because their particles are already close, so pressure has a very small effect on their density.

57. A student makes a saturated solution of sugar in 100 mL of water at 20°C. If the student then heats the solution to 50°C, what will likely happen?
(A) The solution will become unsaturated and can dissolve more.
(B) The solution will remain in a completely saturated state.
(C) Some of the dissolved sugar will come out of the solution.
(D) The water will evaporate, leaving all the sugar behind.

Ans :

(A) The solution will become unsaturated and can dissolve more.
The solubility of sugar in water increases with temperature. Therefore, a solution that was saturated at a lower temperature will become unsaturated at a higher temperature, meaning it now has the capacity to dissolve additional solute.

58. The density of pure water is highest at what temperature?
(A) 0°C
(B) 4°C
(C) 100°C
(D) –4°C

Ans :

(B) 4°C
Water has an anomalous property where it reaches its maximum density not at its freezing point, but at 4°C. As it cools further from 4°C to 0°C, it starts to expand and become less dense.

59. When using a digital balance, placing a container on the pan and then pressing the 'tare' or 'reset' button is done to _____.
(A) To quickly turn the digital balance completely off.
(B) To accurately measure the mass of the container itself.
(C) To set the reading to zero, so only the substance's mass is measured.
(D) To calibrate the balance using a standard, known weight.

Ans :

(C) To set the reading to zero, so only the substance's mass is measured
The tare function subtracts the weight of the container from subsequent measurements. This allows for direct and convenient measurement of the mass of the contents without having to manually subtract the container's mass later.

60. What does a relative density of 2.7 for aluminium mean?
(A) Aluminium has a density of 2.7 kg/m^3.
(B) Aluminium is 2.7 times less dense than water.
(C) 2.7 grams of aluminium has a volume of 1 cm^3.
(D) Aluminium is 2.7 times denser than water.

Ans :

(D) Aluminium is 2.7 times denser than water.
Relative density is a ratio that compares a substance's density to that of water. A value of 2.7 means that the density of aluminium is 2.7 times greater than the density of water. It is a dimensionless number.

61. Why can a mixture of oil and water be described as non-uniform?
(A) Because oil and water do not mix and form separate, visible layers.
(B) Because both the oil and the water are completely colorless liquids.
(C) Because the mixture becomes a solution after it has been stirred.
(D) Because oil is a solute and water is the solvent in the mixture.

Ans :

(A) Because oil and water do not mix and form separate, visible layers.

Click Here to Buy book on Amazon

Oil is immiscible with water and less dense, so it floats on top. This creates distinct layers, and the components are not evenly distributed. This separation and visibility of components are the defining features of a non-uniform mixture.

62. The amount of solute present in a fixed quantity of a solution or solvent is termed its _____.
(A) Solubility
(B) Concentration
(C) Density
(D) Saturation

Ans :

(B) Concentration
Concentration is a measure of the amount of a solute that is dissolved in a specific amount of solvent or solution. It can be expressed in various ways and is used to describe whether a solution is dilute or concentrated.

63. Which of the following is NOT a characteristic of a solution?
(A) The different components are evenly and uniformly distributed.
(B) It is considered to be a completely uniform type of mixture.
(C) The solute particles settle down if the solution is left undisturbed.
(D) The individual components cannot be seen separately by eye.

Ans :

(C) The solute particles settle down if the solution is left undisturbed.
In a true solution, the solute particles are completely dissolved and are so small that they do not settle out due to gravity. The stability of a solution is one of its key characteristics, distinguishing it from a suspension like muddy water.

64. What is the approximate mass of 100 mL of water at room temperature?
(A) 10 g
(B) 50 g
(C) 1000 g
(D) 100 g

Ans :

(D) 100 g
The density of water is approximately 1 g/mL. Therefore, the mass of a certain volume of water in milliliters is roughly equal to its mass in grams. So, 100 mL of water has a mass of about 100 g.

65. A digital balance is to mass as a measuring cylinder is to _____.
(A) Volume
(B) Weight
(C) Density
(D) Temperature

Ans :

(A) Volume
This analogy pairs a measuring instrument with the quantity it is designed to measure. A digital balance is used to determine the mass of an object, while a measuring cylinder is a piece of laboratory glassware used to measure the volume of a liquid.

66. To calculate the density of a perfectly cubical block of wood, you would need to measure its _____.
(A) Its temperature and its specific color
(B) Its mass and the length of one of its sides
(C) Its total weight and its known solubility
(D) Its mass and the time it takes the block to sink

Ans :

(B) Its mass and the length of one of its sides
To find density (Mass/Volume), you need both mass and volume. The mass can be measured with a balance. For a cube, the volume can be calculated by measuring the length of one side (l) and using the formula Volume $= l \times l \times l$.

67. If a saturated solution of salt is cooled down, what is likely to happen?
(A) More salt will now be able to dissolve in the cooled solution.
(B) The cooled solution will become unsaturated and can hold more salt.
(C) Some dissolved salt may crystallize and come out of the solution.
(D) The entire solution will turn from a liquid into a gas.

Ans :

(C) Some dissolved salt may crystallize and come out of the solution.
The solubility of most solids, including salt, decreases as the temperature decreases. Therefore, when a saturated solution is cooled, it can no longer hold all the dissolved solute, and the excess solute will precipitate out as solid crystals.

NODIA
Download INDIA's Best Study app NODIA

68. In a dense forest, trees grow close to each other. The term 'dense' in this context is an analogy for the scientific concept of density, which relates to how much _____ is packed into a given _____.
(A) Space, mass
(B) Energy, mass
(C) Volume, energy
(D) Mass, space (volume)

Ans :

(D) Mass, space (volume)
The analogy of a dense forest helps visualize the concept of scientific density. Just as a dense forest has many trees (matter) packed into an area, a dense substance has a large amount of mass (matter) packed into a given volume (space).

69. In Ayurveda and other traditional Indian medicine systems, what substance is primarily used as a solvent for preparing medicinal formulations?
(A) Water (B) Oil
(C) Ghee (D) Alcohol

Ans :

(A) Water
The water has been the primary solvent used in traditional Indian medicine systems like Ayurveda for creating drug formulations and herbal extracts, highlighting its historical importance as a universal solvent.

70. Which statement about the measurement of volume is INCORRECT?
(A) The SI unit of volume is the cubic metre (m^3).
(B) For accurate reading, your eye should be above the meniscus.
(C) A measuring cylinder is a common apparatus used to measure the volume of liquids.
(D) 1 mL is equivalent to 1 cm^3.

Ans :

(B) For accurate reading, your eye should be above the meniscus.
To avoid parallax error and ensure an accurate measurement, the observer's eye must be at the same level as the meniscus. Looking from above or below will result in an incorrect reading of the volume.

71. A solution containing a small amount of solute is called a _____ solution, while a solution that can still dissolve more solute is called an _____ solution.
(A) Saturated, unsaturated
(B) Concentrated, saturated
(C) Dilute, unsaturated
(D) Dilute, saturated

Ans :

(C) Dilute, unsaturated
'Dilute' refers to a low concentration of solute. 'Unsaturated' refers to the capacity of the solution to dissolve more solute. A dilute solution is almost always unsaturated, as it contains only a small amount of solute relative to its maximum capacity.

72. The ancient practice of using bamboo rafts for travel worked because _____.
(A) Bamboo is very strong and heavy
(B) Bamboo does not get wet
(C) Bamboo attracts fish, helping with navigation
(D) Bamboo is hollow and less dense than water

Ans :

(D) Bamboo is hollow and less dense than water
Bamboo floats easily because its natural structure, which is hollow with air-filled compartments, gives it a very low overall density. This density is significantly less than that of water, allowing it to be buoyant and support weight.

73. An object has a mass of 500 g and a volume of 400 cm^3. Will it float or sink in water (density 1 g/cm^3)?
(A) It will sink because its density is greater than water.
(B) It will float because its density is less than water.
(C) It will sink because its mass is greater than its volume.
(D) It will float because it is a large object.

Ans :

(A) It will sink because its density is greater than water.
First, calculate the object's density : Density = 500 g / 400 cm^3 = 1.25 g/cm^3. Since the object's density (1.25 g/cm^3) is greater than the density of water (1 g/cm^3), it will sink.

74. A key difference between mass and volume is that mass measures the _____, while volume measures the _____.
(A) Space occupied, amount of matter
(B) Amount of matter, space occupied
(C) Force of gravity, density
(D) Density, force of gravity

Downloaded from www.pdf.tube

Ans :

(B) Amount of matter, space occupied
These are two distinct fundamental properties. Mass quantifies the amount of matter an object contains. Volume quantifies the three-dimensional space that the object occupies.

75. An unpeeled orange floats in water, but after peeling, the same orange sinks. Why does this happen?
(A) The process of peeling the orange actually makes it heavier.
(B) The orange juice inside the fruit reacts with the water.
(C) The peel contains air pockets, making the orange less dense.
(D) The peel itself is much more dense than the orange fruit.

Ans :

(C) The peel contains air pockets, making the orange less dense.
The rind of an orange is porous and traps many small air bubbles. These air pockets increase the overall volume of the unpeeled orange without adding much mass, making its average density less than water. Removing the peel eliminates this buoyancy, and the denser fruit sinks.

76. What is solubility?
(A) The specific speed at which a particular solute dissolves.
(B) The exact temperature at which a particular solute dissolves.
(C) The general ability of a substance to form any type of solution.
(D) The maximum amount of solute that can dissolve in a solvent.

Ans :

(D) The maximum amount of solute that can dissolve in a solvent.
Solubility is a specific, quantitative measure. It defines the exact maximum mass of a solute that can be dissolved to form a saturated solution in a given amount of solvent (often 100g or 100mL) at a specific temperature.

77. An ORS (Oral Rehydration Solution) tastes the same in every sip because it is a _____.
(A) A uniform mixture (solution) with evenly distributed components
(B) A non-uniform mixture where the components have all separated
(C) A saturated solution with some salt and sugar at the bottom
(D) A chemical compound made of salt, sugar, and pure water

Ans :

(A) a uniform mixture (solution) with evenly distributed components
ORS is a true solution. The salt and sugar dissolve completely in the water, and their particles spread out evenly throughout the entire volume. This homogeneous distribution ensures a consistent composition and taste.

78. Which of the following is an INCORRECT pairing?
(A) Solute - The substance that dissolves.
(B) Solution - A non-uniform mixture.
(C) Solvent - The substance in which the solute dissolves.
(D) Saturated - A solution holding the maximum amount of solute.

Ans :

(B) Solution - A non-uniform mixture.
A solution is, by definition, a uniform (homogeneous) mixture. A non-uniform (heterogeneous) mixture, like sand in water, is one where the components are not evenly distributed and can be distinguished.

NODIA

79. To calculate the volume of a rectangular notebook, you need to measure its _____.
(A) Mass, width, and height
(B) Length, width, and mass
(C) Length, width, and height
(D) Density, mass, and length

Ans :

(C) Length, width, and height
The volume of a rectangular solid (a cuboid) is found by multiplying its three dimensions. Therefore, measuring its length, width, and height with a scale is required to calculate its volume using the formula $V = l \times w \times h$.

80. A ship made of dense steel floats on water. This is possible because _____.
(A) The dense steel is painted to make it completely waterproof
(B) The ship's powerful engine is constantly pushing it upwards
(C) The ocean water is much denser than regular fresh water
(D) The ship's hollow shape displaces a large volume of water

Ans :

(D) The ship's hollow shape displaces a large volume of water
While the steel itself is very dense, the ship is mostly empty space. Its hollow hull displaces a huge volume of water. According to Archimedes' principle, this creates an upward buoyant force equal to the weight of that displaced water, which is enough to support the ship's total weight.

81. A measuring cylinder is to liquid volume as a digital balance is to _____.
(A) Liquid mass (B) Liquid density
(C) Liquid weight (D) Liquid temperature

Ans :

(A) Liquid mass
A measuring cylinder is the standard tool for measuring the volume of a liquid. To find the mass of that liquid, one would pour it into a beaker placed on a digital balance (after taring the beaker).

82. A student has a block of wood with a mass of 80 g and a volume of 100 cm^3. If the block is placed in water (density 1 g/cm^3), what will happen?
(A) It will sink to the bottom.
(B) It will float with some of its volume above the water.
(C) It will dissolve in the water.
(D) It will remain suspended in the middle of the water.

Ans :

(B) It will float with some of its volume above the water.
First, calculate the density of the wood : Density = 80 g / 100 cm^3 = 0.8 g/cm^3. Since the density of the wood (0.8 g/cm^3) is less than the density of water (1 g/cm^3), the wood will float.

MATCHING TYPE QUESTIONS

83. Match the basic terms of a solution with their correct definitions.

	Column A		Column B
1	Solute	A	The substance that does the dissolving, usually present in a larger amount.
2	Solvent	B	A mixture where components are not evenly distributed, such as sand in water.
3	Solution	C	The substance that gets dissolved, which is usually present in a smaller amount.
4	Non-uniform Mixture	D	A uniform mixture formed when one substance dissolves completely into another.

Options
(a) 1-A, 2-C, 3-B, 4-D
(b) 1-D, 2-B, 3-A, 4-C
(c) 1-C, 2-A, 3-D, 4-B
(d) 1-B, 2-D, 3-C, 4-A

Ans :

(c) 1-C, 2-A, 3-D, 4-B
A solute is the substance that dissolves in a solvent to form a uniform mixture called a solution. A non-uniform mixture has components that are not evenly distributed.

84. Match the type of solution with its correct description.

	Column A		Column B
1	Saturated Solution	A	A solution containing a relatively small amount of dissolved solute.
2	Unsaturated Solution	B	A solution containing a relatively large amount of dissolved solute.
3	Dilute Solution	C	A solution in which more solute can be dissolved at a given temperature.
4	Concentrated Solution	D	A solution in which no more solute can be dissolved at a given temperature.

Options
(a) 1-B, 2-A, 3-D, 4-C
(b) 1-D, 2-C, 3-A, 4-B
(c) 1-C, 2-D, 3-B, 4-A
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(b) 1-D, 2-C, 3-A, 4-B

Click Here to Buy book on Amazon

50. A raw egg sinks in a glass of tap water. If a large amount of salt is dissolved in the water, the egg will float. This is because dissolving salt _____.
(A) Makes the egg lighter
(B) Increases the density of the water
(C) Decreases the volume of the egg
(D) Creates a chemical reaction with the eggshell

Ans :

(B) Increases the density of the water
Adding salt to water increases the solution's mass more than its volume, thus increasing its overall density. When the water's density becomes greater than the egg's average density, the buoyant force becomes strong enough to make the egg float.

51. A student measures the volume of a liquid using a measuring cylinder and finds it to be 48 mL. What is this volume in cubic centimeters (cm^3)?
(A) 4.8 cm^3 (B) 480 cm^3
(C) 48 cm^3 (D) 0.48 cm^3

Ans :

(C) 48 cm^3
The units millilitre (mL) and cubic centimetre (cm^3 or cc) are equivalent units of volume. Therefore, 1 mL is equal to 1 cm^3, and a volume of 48 mL is exactly equal to 48 cm^3.

52. The mass of an object is a measure of its _____, while its weight is a measure of the force of _____.
(A) Volume, density (B) Density, pressure
(C) Size, friction (D) Inertia, gravity

Ans :

(D) Inertia, gravity
Mass is the fundamental property of an object that measures its inertia (resistance to changes in motion). Weight is not an intrinsic property but is the gravitational force exerted on that mass by a celestial body like Earth.

53. Which of the following is an INCORRECT use of the terms solute and solvent?
(A) In a sand and water mix, sand is the solute, water the solvent.
(B) In sugar water, sugar is the solute and water is the solvent.
(C) In air, nitrogen is the solvent and oxygen is a solute.
(D) In a mix of alcohol and water, alcohol is the solute if less.

Ans :

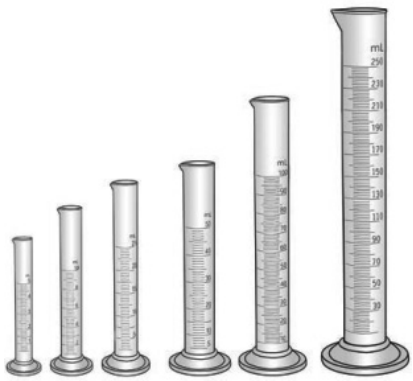
(A) In a sand and water mix, sand is the solute, water the solvent.
The terms solute and solvent apply only to solutions, where one substance dissolves in another. Since sand does not dissolve in water, the mixture is not a solution, and the terms solute and solvent are not applicable.

54. A substance with a _____ density than water will sink, while a substance with a _____ density than water will float.
(A) Lower, higher
(B) Higher, lower
(C) Similar, different
(D) Different, similar

Ans :

(B) Higher, lower
An object's behavior in water is determined by comparing its density to water's density. If the object is denser (more mass per unit volume), it will sink. If it is less dense, it will float.

55. A student needs to measure exactly 25 mL of a liquid. Looking at the measuring cylinders in figure, which one would provide the most accurate measurement?



(A) The 250 mL cylinder
(B) The 100 mL cylinder
(C) The 25 mL cylinder
(D) The 50 mL cylinder

Ans :

(C) The 25 mL cylinder
For the most accurate measurement, you should choose the smallest graduated cylinder that can contain the entire volume. A smaller cylinder has finer gradations (a smaller least count), which reduces measurement error and increases precision.

NODIA

TRUE AND FALSE

88. A solution is a type of non-uniform mixture where the different components are clearly visible.

Ans :

False
A solution is a uniform mixture where the components are evenly distributed and cannot be distinguished from each other.

89. When mixing two liquids to form a solution, the substance present in the larger quantity is called the solvent.

Ans :

True
In a solution formed by mixing two liquids, the substance present in the larger amount is called the solvent, while the one in the smaller amount is the solute.

90. A saturated solution is a solution that can still dissolve more solute at a given temperature.

Ans :

False
A saturated solution is one in which no more solute can be dissolved at that particular temperature; any excess solute will settle at the bottom.

91. For most solid solutes, their solubility in a liquid increases as the temperature of the liquid increases.

Ans :

True
For most solid substances, their solubility increases with a rise in temperature, allowing more of the substance to dissolve in a hot solvent than in a cold one.

92. The solubility of gases in water increases when the water is heated.

Ans :

False The solubility of gases generally decreases as the temperature increases. This is why more oxygen can dissolve in cold water than in warm water.

93. Density is scientifically defined as the mass per unit volume of a substance.

Ans :

True
Density is defined as the mass present in a unit volume of a substance, and its formula is Density=Volume /Mass.

94. The SI unit of density is grams per cubic centimeter (g/cm^3).

Ans :

False The official SI unit of density is kilogram per cubic metre (kg/m^3). While g/cm^3 is a commonly used unit, it is not the SI unit.

95. The density of a substance is independent of its shape or size.

Ans :

True
The density of a substance is a characteristic property that does not change with the object's shape or size.

96. The volume of an irregularly shaped solid can be determined by immersing it in water and measuring the volume of water it displaces.

Ans :

True
The volume of an irregular solid can be found by placing it in a measuring cylinder with water and recording the rise in the water level.

97. When most substances are heated, their density increases because their particles expand.

Ans :

False
Generally, the density of a substance decreases with heating because its volume increases while its mass remains constant.

98. For gases, an increase in pressure leads to a decrease in density.

Ans :

False
When the pressure on a gas is increased, its particles are forced closer together, which decreases its volume and therefore increases its density.

99. In the gaseous solution of air, nitrogen is considered the solvent.

Ans :

True

NODIA

A saturated solution is a state where a solvent has dissolved the maximum amount of solute possible at a given temperature. A real-world example is making sweet tea; if you keep adding sugar, you'll reach a point where the sugar no longer dissolves and starts to collect at the bottom of the glass, indicating the tea is saturated with sugar.

149. The table below shows the maximum amount of baking soda that can be dissolved in 50 mL of water at different temperatures. What relationship between temperature and solubility can be concluded from this data?

Temperature of Water	Max. Amount of Baking Soda Dissolved
20°C	4.8 g
50°C	6.5 g
70°C	8.0 g

Ans :

The data shows that as the temperature of the water increases, the amount of baking soda that can be dissolved also increases. Therefore, for most solid solutes like baking soda, solubility increases with an increase in temperature, allowing more solute to be dissolved.

150. Why does a massive iron ship float on water, while a tiny iron nail sinks?

Ans :

An iron ship floats because its hollow shape displaces a large volume of water. Although it is very heavy, its overall density (mass divided by its large volume) is less than the density of water. In contrast, a tiny iron nail is solid and dense, displacing very little water, so its density is greater than water, causing it to sink.

151. Outline the correct procedure for measuring the mass of a solid object using a digital balance.

Ans :

To measure the mass of a solid, first place a dry watch glass on the digital balance and press the tare button to reset the reading to zero. This step ensures you are only measuring the object's mass. Next, carefully place the solid object on the watch glass. The reading displayed on the balance will be the accurate mass of the object.

152. Explain the scientific principle that allows a hot air balloon to rise into the sky.

Ans :

A hot air balloon rises based on the principle of density. The air inside the balloon is heated, causing its particles to spread out. This expansion increases the volume of the air without changing its mass, which significantly decreases its density. Since the hot air inside the balloon is now less dense than the cooler, denser air outside, it floats upwards.

153. Describe how to accurately measure a specific volume of a liquid using a measuring cylinder.

Ans :

To accurately measure a liquid's volume, place a measuring cylinder on a flat surface and slowly pour the liquid to the desired mark. For colorless liquids, read the volume at the bottom of the curved surface, known as the meniscus. It is crucial to keep your eyes at the same level as the meniscus to avoid parallax error and ensure an accurate reading.

154. The table shows the amount of oxygen that can dissolve in 1 litre of water at different temperatures. Based on this data, explain why aquatic animals are more comfortable in cold water than in warm water.

Water Temperature	Dissolved Oxygen (mg/L)
0°C	14.6
10°C	11.3
20°C	9.1
30°C	7.5

Ans :

The table shows that the solubility of oxygen decreases as water temperature increases. Cold water can hold more dissolved oxygen, which is essential for aquatic animals to breathe. Warm water has less available oxygen, making it difficult for them to survive.

155. Explain the ecological importance of the relationship between water temperature and the solubility of oxygen.

Ans :

The inverse relationship between water temperature and oxygen solubility is crucial for aquatic ecosystems. Colder water can hold more dissolved oxygen, which is essential for the survival of fish and other aquatic organisms. As water warms up, oxygen solubility decreases,

Downloaded from www.pdf.tube

The relationship between mass, volume, and density is expressed by the mathematical formula:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

113. How does increasing temperature generally affect the solubility of solid substances?

Ans :

For most solid substances, solubility increases with an increase in temperature, allowing more solute to dissolve in the solvent at higher temperatures.

114. What is the effect of temperature on the solubility of gases in liquids?

Ans :

The solubility of gases in liquids generally decreases as the temperature increases, meaning less gas can dissolve in warmer water.

115. In the gaseous solution of air, which gas is considered the solvent?

Ans :

Nitrogen is considered the solvent in the gaseous solution of air because it is the gas present in the largest amount.

116. What is the curved surface of water in a measuring cylinder called?

Ans :

The curved surface that water forms inside a measuring cylinder or any narrow container is known as the meniscus.

117. Which common laboratory apparatus is used to measure the volume of liquids?

Ans :

A measuring cylinder is a common laboratory apparatus specifically designed with markings to accurately measure the volume of various liquids.

118. How is the relative density of a substance with respect to water determined?

Ans :

The relative density of a substance is determined by dividing the density of that substance by the density of water at that temperature.

119. What are the two primary types of mixtures?

Ans :

The two main types of mixtures : uniform mixtures, where components are evenly distributed, and non-uniform mixtures, where they are not.

120. Why does ORS, a mixture of sugar and salt, taste the same in every sip?

Ans :

Homemade ORS tastes uniform because sugar and salt form a solution where the components are evenly distributed throughout the water.

NODIA

121. What is the special property of water regarding its density and temperature?

Ans :

Water has a special property where its density is highest at $4^{\circ}C$, meaning it is heaviest at this specific temperature.

122. What is the term for the smallest volume a measuring cylinder can accurately read?

Ans :

The smallest volume that a measuring cylinder can accurately read is determined by the value indicated by one small division on its scale.

123. Why can you dissolve more baking soda in hot water than in cold water?

Ans :

You can dissolve more baking soda in hot water because the solubility of most solids increases as the temperature of the solvent increases.

124. How does the process of making salt in Ningel village demonstrate evaporation?

Ans :

In Ningel, a salt solution is boiled in large pans, causing the water to evaporate and leave behind salt crystals.

125. Why is it incorrect to assume that an object that floats is always lighter than one that sinks?

Ans :

This is incorrect because floating or sinking depends on density, not just weight. A large wooden log can float while a small iron nail sinks.

126. Explain why a saturated salt solution at 20°C becomes unsaturated at 50°C.

Ans :

- The peel is porous and contains many tiny air pockets.
- These air pockets reduce the overall density of the entire orange.
- This makes the unpeeled orange less dense than water, causing it to float.
- When peeled, the orange loses this buoyancy, becomes denser than water, and sinks.

164. The mass and volume of three different items are given in the table. Calculate the density for each and predict whether it will float or sink in water (density of water ≈ 1 g/cm³).

Item	Mass (g)	Volume (cm³)
Wood Block	80	100
Iron Nail	15.6	2
Plastic Toy	25	30

Ans :

Wood block density is 0.8 g/cm³ (floats). Iron nail density is 7.8 g/cm³ (sinks). Plastic toy density is 0.83 g/cm³ (floats). An object floats if its density is less than water and sinks if its density is greater than water.

165. What are the defining characteristics of an unsaturated solution?

Ans :

An unsaturated solution is defined by the following characteristics:

- It contains less solute than the maximum amount the solvent can dissolve at a specific temperature.
- If more solute is added to it, the additional solute will dissolve completely.
- The solution appears clear and uniform, with no undissolved particles settling at the bottom.
- It has not yet reached its solubility limit for that particular temperature.

166. Compare the densities of Object A (mass 200 g, volume 40 cm³) and Object B (mass 240 g, volume 60 cm³).

Ans :

To compare the densities, we must calculate the density for each object using the formula:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

- For Object A:

  $\text{Density} = 200\text{g} \div 40\text{cm}^3 = 5\text{g/cm}^3$.
- For Object B:

  $\text{Density} = 240\text{g} \div 60\text{cm}^3 = 4\text{g/cm}^3$.
- Conclusion : Object A is denser than Object B because its density value is higher.

167. How can air be classified as a solution, and what are its main components?

Ans :

Air is classified as a gaseous solution based on its composition:

- It is a uniform mixture of multiple gases.
- The solvent is nitrogen, as it is the component present in the largest amount.
- The solutes are the other gases present in smaller amounts.
- These solutes include oxygen, argon, carbon dioxide, and trace amounts of other gases.

168. How could you use the principle of density to separate a mixture of sand and sawdust?

Ans :

The principle of density allows for an effective separation of sand and sawdust through these steps:

- Add the mixture to a container of water.
- Stir the mixture thoroughly to ensure all particles are wetted.
- The sawdust, being less dense than water, will float on the surface.
- The sand, being denser than water, will sink to the bottom.
- Skim the floating sawdust off the top and then pour out the water to collect the sand.

169. Describe the importance of dissolved oxygen in water for the survival of aquatic life.

Ans :

Dissolved oxygen is vital for aquatic life due to the following reasons:

- It is essential for the respiration of aquatic organisms like fish and plants.
- Aquatic life extracts this dissolved oxygen directly from the water to sustain their metabolic processes.
- The amount of dissolved oxygen, although small, determines the health and viability of the aquatic ecosystem.
- Without sufficient dissolved oxygen, aquatic environments cannot support life.

Click Here to Buy book on Amazon

140. How is the structure of Earth's layers related to the density of materials?

Ans :

The Earth's layers are arranged by density; the lightest materials form the outer crust, while the densest materials make up the inner core.

Download INDIA's Best Study app NODIA

141. Compare the solubility of gases in a cold mountain stream and a warm pond.

Ans :

Gases like oxygen are more soluble in the cold mountain stream, supporting more aquatic life, than in the warmer pond water.

142. Why do sand particles sink in water while sawdust particles float?

Ans :

Sand sinks because it is denser than water, while sawdust floats because it is less dense than water, causing them to separate.

SHORT ANSWER QUESTIONS

143. Describe the fundamental components that make up a solution, providing a common example.

Ans :

A solution is a uniform mixture composed of two main components : a solute and a solvent. The solute is the substance that dissolves, and the solvent is the substance in which the solute dissolves. For example, when making saltwater, salt is the solute that dissolves in water, which acts as the solvent, forming a saltwater solution.

144. Explain why stirring a mixture of sugar and water helps the sugar dissolve more quickly.

Ans :

Stirring helps sugar dissolve faster in water by increasing the contact between the solute (sugar) particles and the solvent (water) particles. The motion distributes the sugar particles throughout the water, preventing a concentrated layer from forming at the bottom and allowing fresh solvent molecules to constantly interact with the surface of the sugar crystals, accelerating the dissolution process.

145. Differentiate between a uniform mixture and a non-uniform mixture with relevant examples.

Ans :

A uniform mixture, or solution, has its components evenly distributed, and they cannot be seen separately, like sugar dissolved in water. In contrast, a non-uniform mixture has components that are not evenly distributed and are often visible, such as a mixture of sand and water where the sand settles at the bottom, or sawdust floating on top.

146. The table shows the results of an experiment where a student keeps adding salt to a fixed amount of water at room temperature. At which point does the solution become saturated, and what does this term mean?

Amount of Salt Added (Teaspoon)	**Observation**
One	Salt dissolves completely
Two	Salt dissolves completely
Three	Salt dissolves completely
Four	Some salt remains undissolved

Ans :

The solution becomes saturated when the fourth teaspoon of salt is added. A saturated solution is one in which the maximum amount of solute (salt) has been dissolved in the solvent (water) at a given temperature, and no more solute can be dissolved.

NODIA

147. Explain why the solubility of most solid solutes, such as baking soda, increases with temperature.

Ans :

The solubility of most solids increases with temperature because heating provides more energy to the solvent molecules. This increased energy allows the solvent particles to move faster and more effectively break the bonds holding the solute particles together. As a result, more solute can be accommodated in the spaces between solvent particles, leading to higher solubility at elevated temperatures.

148. Describe the state of a saturated solution using a real-world example from the kitchen.

Ans :

- Apply the density formula :

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}.$$

- Divide the measured mass by the measured volume to obtain the density value.

177. How is a solution of gases, like air, different from a liquid solution?

Ans :

A gaseous solution like air differs from a liquid solution in several key ways:

- **State of Matter** : All components in a gaseous solution are in the gas phase.
- **Solvent Identification** : In air, nitrogen is the solvent because it's the most abundant component.
- **Compressibility** : Gaseous solutions are highly compressible, unlike liquid solutions.
- **Particle Movement** : Gas particles move much more freely and at higher speeds than particles in a liquid solution.

Download INDIA's Best Study app NODIA

LONG ANSWER QUESTIONS

178. Detail the complete experimental procedure for determining the density of an irregularly shaped solid.

Ans :

The procedure to find the density of an irregular solid involves measuring both its mass and volume separately.

- **Mass Measurement** : Place a clean watch glass on a digital balance and tare it to zero. Then, place the irregular solid on the watch glass and record the mass displayed in grams.
- **Volume Measurement** : Fill a measuring cylinder with enough water to submerge the object and record this initial volume. Carefully lower the solid into the cylinder until it is fully submerged. Record the new, final water level.
- **Calculation** : The volume of the solid is the difference between the final and initial water levels. Finally, calculate the density by dividing the measured mass by the calculated volume ($\text{Density} = \frac{\text{Mass}}{\text{Volume}}$).

179. Explain the dynamic relationship between temperature, solubility, and the state of a solution (saturated vs. unsaturated).

Ans :

The relationship between these factors determines how much solute can dissolve in a solvent.

- **Solubility and Temperature** : For most solid solutes, solubility increases as temperature rises. This means that a warmer solvent can hold more dissolved solute than a cooler one.
- **Saturated vs. Unsaturated** : An unsaturated solution can still dissolve more solute. A saturated solution has reached its maximum capacity at a given temperature.
- **Dynamic Change** : A solution saturated at a low temperature will become unsaturated if heated, as the increased temperature raises its solubility limit, allowing more solute to be dissolved. Conversely, cooling a saturated solution often causes excess solute to crystallize out.

180. Describe the concepts of solute, solvent, and solution using three distinct examples involving different states of matter.

Ans :

These concepts are fundamental to understanding mixtures and can be illustrated with various examples.

- **Solid in Liquid** : In a saltwater solution, the solid salt is the solute that dissolves in the liquid water, which is the solvent. This creates a uniform liquid solution.
- **Liquid in Liquid** : When mixing vinegar and water, the vinegar (acetic acid solution), if in a smaller amount, acts as the solute, while the water is the solvent.
- **Gas in Gas** : Air is a gaseous solution where nitrogen, the most abundant gas, acts as the solvent. Other gases like oxygen, argon, and carbon dioxide are considered solutes.

181. Compare and contrast the key characteristics of uniform and non-uniform mixtures, providing specific examples for each.

Ans :

Mixtures are combinations of substances, but their properties vary based on how the components are distributed.

- **Uniform Mixtures (Solutions)** : In these mixtures, the components are evenly

Downloaded from www.pdf.tube

which can stress or harm aquatic life, highlighting the impact of temperature changes on the health of these environments.

156. Detail the method of displacement for determining the volume of an irregularly shaped solid like a key.

Ans :

To find the volume of an irregular solid, use the displacement method. First, partially fill a measuring cylinder with water and record the initial volume. Then, carefully submerge the object completely in the water. The water level will rise. Record this new, final volume. The difference between the final and initial volumes is the volume of the irregularly shaped object.

157. If you have two unlabeled solutions of saltwater, how could you experimentally determine which one is more concentrated?

Ans :

To determine which saltwater solution is more concentrated, one could measure the density of each. Since salt is denser than water, the solution with the higher concentration of dissolved salt will have a greater mass for the same volume. By measuring equal volumes of each solution and weighing them, the heavier one would be the more concentrated solution.

158. Explain the concept of density and identify the factors that can influence it.

Ans :

Density is a fundamental property of matter, defined as the mass of a substance contained within a unit of its volume. It essentially describes how tightly packed the matter is within an object. The density of a substance is independent of its shape or size but is significantly influenced by temperature and, for gases, by pressure as well.

159. How does increasing pressure affect the density of gases, and why is this effect minimal in liquids?

Ans :

Increasing pressure on a gas forces its particles closer together, which reduces its volume and thereby increases its density. This effect is significant because gases are highly compressible. In contrast, liquids are nearly incompressible, meaning their particles are already close together. Therefore, applying pressure has a very small and often negligible effect on the volume and density of a liquid.

160. A student measures the mass and volume of two different objects, A and B, and records the data in the table. Calculate the density of each object and determine which object is denser.

Object	Mass (g)	Volume (cm^3)
A	200 g	40 cm^3
B	240 g	60 cm^3

Ans :

The density of Object A is 200 g / 40 cm^3 = 5 g/cm^3. The density of Object B is 240 g / 60 cm^3 = 4 g/cm^3. Therefore, Object A is denser than Object B as it has a greater mass per unit volume.

161. List the common units used to express density, including the standard international (SI) unit.

Ans :

Density is expressed in various units depending on convenience. The standard international (SI) unit is kilograms per cubic meter (kg/m^3). For liquids, it is more common to use grams per milliliter (g/mL) or grams per cubic centimeter (g/cm^3). These units are practical for laboratory measurements and everyday applications, providing a clear measure of a substance's mass per unit volume.

162. Outline the steps to prepare a saturated solution of salt in a glass of water.

Ans :

The process to create a saturated salt solution involves these steps:

- Start by filling a glass tumbler halfway with water at a constant temperature.
- Add one spoonful of salt and stir thoroughly until it dissolves completely.
- Continue adding salt, one spoonful at a time, and stirring after each addition.
- Stop adding salt when it no longer dissolves and begins to settle at the bottom of the glass.

163. Explain scientifically why an unpeeled orange floats in water, but a peeled orange sinks.

Ans :

An unpeeled orange floats due to its rind, which has several key properties:

NODIA

It becomes unsaturated because the solubility of salt increases with temperature, allowing more salt to dissolve at the higher temperature of 50°C.

127. How does the density of Earth's layers change as you move toward the center?

Ans :

The density of Earth's layers increases as one moves towards the center, with the crust being the lightest and the core being the densest.

128. How is it possible that a large amount of sugar can be dissolved in Chashni?

Ans :

Chashni is a concentrated sugar syrup where a large amount of sugar is dissolved in a small amount of water, often using heat.

129. Explain why hot air rises using the concept of density.

Ans :

Hot air rises because heating causes its particles to spread, increasing its volume and decreasing its density, making it lighter than cooler air.

130. Why do packets of oil often show a volume of 1 litre but a weight of 910 grams?

Ans :

This indicates that the oil is less dense than water. Since 1 litre of water weighs 1000 grams, the oil is lighter.

131. How does pressure significantly affect the density of gases but not liquids?

Ans :

Increasing pressure forces gas particles closer together, decreasing volume and increasing density. Liquids are nearly incompressible, so pressure has a small effect.

132. Explain why it is important for aquatic life that ice floats on water.

Ans :

Ice floating on water forms an insulating layer on top, keeping the water below warm enough for fish and other creatures to survive.

133. Why is it possible to make a raw egg float in tap water?

Ans :

An egg can be made to float by increasing the density of the tap water, for example, by dissolving a large amount of salt in it.

134. Why is a tall, narrow measuring cylinder more accurate than a wide, short one for measuring volume?

Ans :

A tall, narrow design results in a more noticeable change in the liquid's height for a small change in volume, allowing for more precise readings.

135. Compare the solubility of oxygen in the cold waters of the Arctic versus warm tropical waters.

Ans :

The solubility of oxygen is higher in the cold Arctic waters, allowing more oxygen to dissolve and support aquatic life compared to warm tropical waters.

136. Why must you keep your eyes level with the meniscus when measuring volume?

Ans :

Viewing the meniscus from an angle above or below can lead to an inaccurate reading, so eye-level measurement ensures precision and correctness.

137. Differentiate a dilute solution from a concentrated one using salt water as an example.

Ans :

A solution with one spoon of salt in water is dilute, while one with four spoons of salt is concentrated because it contains more solute.

138. How is the method of displacement used to find the volume of an irregular stone?

Ans :

The stone is submerged in a measuring cylinder with water, and the rise in water level equals the volume of the stone.

139. Why does oil float on water instead of mixing with it?

Ans :

Oil floats on water because it is less dense than water and does not dissolve in it, causing it to form a separate layer on top.

Download INDIA's Best Study app NODIA

Click Here to Buy book on Amazon

170. Explain the unique behavior of water's density as it cools from 10°C to 0°C.

Ans :

The density of water exhibits unique behavior upon cooling:

- As water cools from 10°C, its density increases, reaching its maximum at 4°C.
- Below 4°C, water molecules start to arrange into a crystalline structure.
- This structure takes up more space, causing the water to expand.
- As a result, from 4°C down to freezing at 0°C, the density of water actually decreases.

171. What are the steps involved in measuring the volume of an object using the displacement method?

Ans :

The displacement method for measuring volume involves the following key steps:

- Fill a measuring cylinder with a known initial volume of water.
- Carefully and completely submerge the object in the water.
- Observe the new, final volume of the water in the cylinder.
- Calculate the difference between the final and initial volumes to find the object's volume.

172. How did the work of scientist Asima Chatterjee highlight the importance of solvents in medicine?

Ans :

The contributions of Asima Chatterjee are significant for these reasons:

- She extensively used solvents and solutions in her research on medicinal plants.
- Her work involved extracting and isolating important chemical compounds from plants.
- This process was fundamental to the development of new anti-epileptic and anti-malarial drugs.
- Her success demonstrated how crucial solvents are for creating modern medicinal formulations from natural sources.

173. How is density a key factor in the layered structure of planet Earth?

Ans :

Density plays a crucial role in Earth's structure in the following ways:

- The planet is composed of several distinct layers.
- These layers are arranged according to their density.
- The outermost layer, the crust, is the lightest and least dense.
- The density of the layers progressively increases as you move deeper.
- The innermost core is the densest layer, composed of the heaviest materials.

174. Explain how a single drop of water on a plastic strip can act as a simple lens.

Ans :

A water drop can function as a simple lens due to these properties:

- Surface tension causes the water drop to form a curved, convex surface.
- This curved surface refracts, or bends, the light passing through it.
- When light from an object below passes through the drop, the rays are bent outwards.
- This refraction magnifies the image of the object, making it appear larger, just like a magnifying glass.

175. What are the three fundamental characteristics of a true solution?

Ans :

A true solution is defined by these three primary characteristics:

- It is a uniform mixture, meaning the components are evenly distributed throughout.
- The individual particles of the solute are so small that they cannot be seen, even with a microscope.
- The solution is stable, meaning the solute particles do not settle out over time.
- It is typically transparent, allowing light to pass through without scattering.

176. How would you calculate the density of a liquid if you are given its mass and volume?

Ans :

The density of a liquid can be calculated using a straightforward formula and process:

- First, accurately measure the mass of the liquid, typically in grams (g).
- Next, accurately measure the volume of the same liquid, usually in milliliters (mL) or cubic centimeters (cm^3).

Downloaded from www.pdf.tube

Because nitrogen is the gas present in the largest amount in the air, it is considered the solvent, while all other gases are considered solutes.

100. Ice floats on water because it is denser than liquid water.

Ans :

False
Ice floats because it is less dense than liquid water. As water freezes, it expands, causing its density to decrease.

101. In a saltwater solution, the salt is considered the solvent and the water is the solute.

Ans :

False
When a solid is dissolved in a liquid, the solid component (salt) is the solute, and the liquid component (water) is the solvent.

102. A measuring cylinder is the standard laboratory instrument used for accurately measuring the mass of a liquid.

Ans :

False
A measuring cylinder is used to measure the volume of a liquid. Mass is measured using a balance.

VERY SHORT QUESTIONS

103. What is a uniform mixture, such as salt in water, called in science?

Ans :

A uniform mixture, where components are evenly distributed and cannot be seen separately, is called a solution in scientific terms.

104. Define the term 'solute' in a solution formed from a solid and a liquid.

Ans :

In a solution made by mixing a solid with a liquid, the solid component that dissolves is known as the solute.

105. What is the role of a 'solvent' in a solution of two liquids?

Ans :

In a solution formed by two liquids, the substance present in the larger amount is called the solvent, which dissolves the solute.

106. Explain what an unsaturated solution is at a specific temperature.

Ans :

An unsaturated solution is a solution in which more solute can still be dissolved at a particular given temperature without settling.

NODIA

107. What defines a saturated solution at a particular temperature?

Ans :

A saturated solution is one where no more solute can be dissolved at that specific temperature, and any excess solute settles.

108. What is meant by the concentration of a solution?

Ans :

The concentration of a solution is defined as the amount of solute present in a fixed quantity of the solution or solvent.

109. How is the solubility of a solute scientifically defined?

Ans :

Solubility is the maximum amount of a solute that can dissolve in a fixed quantity of a solvent to form a solution.

110. What is density and how is it scientifically expressed?

Ans :

Density is defined as the mass present in a unit volume of a substance and is a measure of its heaviness.

111. What is the standard SI unit for measuring density?

Ans :

The SI unit for density is kilogram per cubic metre, which is commonly abbreviated as kg/m^3 in scientific notation.

112. State the mathematical formula that relates mass, volume, and density.

Ans :

distributed at the particle level. They appear as a single substance, and the individual components cannot be seen. Examples include saltwater, air, and sugar dissolved in tea.

- **Non-Uniform Mixtures** : Here, the components are not evenly distributed and can often be seen as separate parts. The composition varies from one part of the mixture to another. Examples include sand in water, where sand settles, and a salad with different visible vegetables.

182. Explain the proper technique for using a measuring cylinder to ensure an accurate measurement of a liquid's volume.

Ans :

Accurate volume measurement with a measuring cylinder requires careful technique to avoid errors.

- **Placement** : The cylinder must be placed on a completely flat and stable surface to ensure the liquid level is horizontal.
- **Reading the Meniscus** : For water and most transparent liquids, the surface forms a downward curve called a meniscus. The reading must be taken from the bottom of this curve.
- **Eye Level** : To avoid parallax error, your eyes must be at the same level as the meniscus. Looking from above or below will result in an incorrect reading.
- **Choosing the Right Size** : Use a cylinder with a capacity close to the volume you are measuring for better precision.

183. Analyze why a large log floats in water while a small pebble sinks, referencing the principles of density.

Ans :

The phenomenon of floating and sinking is primarily governed by the principle of density, not just size or weight.

- **Density Principle** : An object will float if its overall density is less than the density of the liquid it is in. It will sink if its density is greater.
- **The Log** : A log, despite being large and heavy, has a density lower than water. Wood contains air pockets and has a less compact structure, making its mass-to-volume ratio smaller than water's.
- **The Pebble** : A pebble, although small and light, is made of rock, which is very dense. Its mass is packed into a tiny volume, making its density significantly greater than water's, causing it to sink.

184. Elaborate on how temperature and pressure distinctly affect the density of solids, liquids, and gases.

Ans :

The effect of temperature and pressure on density varies significantly across the different states of matter.

- **Gases** : The density of gases is highly sensitive to both temperature and pressure. Increasing temperature causes gases to expand, decreasing density. Increasing pressure compresses gases, increasing density.
- **Liquids** : The density of liquids is mainly affected by temperature; they generally expand when heated, which decreases their density. Pressure has a very small, often negligible, effect because liquids are nearly incompressible.
- **Solids** : For solids, temperature causes slight expansion and thus a slight decrease in density. Pressure has almost no effect on the density of solids as their particles are already tightly packed.

185. A student plans to dissolve sugar in three beakers of water : one with ice-cold water, one with room-temperature water, and one with hot water. Predict the results and explain the scientific reasoning.

Ans :

The expected results are based on the principle that the solubility of sugar increases with temperature.

- **Ice-Cold Water** : The student will find it difficult to dissolve much sugar. The low temperature means water molecules have less energy to break apart the sugar crystals, so solubility is very low.
- **Room-Temperature Water** : A moderate amount of sugar will dissolve. This serves as a baseline for comparison, showing average solubility under normal conditions.
- **Hot Water** : The most sugar will dissolve in this beaker. The high energy of the hot water molecules allows them to dissolve the sugar much more quickly and to a greater extent, creating the most concentrated solution.

Click Here to Buy book on Amazon

Questions:

1. What is the curved surface of a liquid in a narrow container called?
2. For a colorless liquid like water, should the volume be read from the top or the bottom of the curved surface?
3. Why is it important to have your eyes at the same level as the liquid's surface when taking a reading?

Ans :

1. The curved surface is called the meniscus.
2. The reading should be taken from the bottom of the meniscus.
3. Viewing the scale from an angle (either above or below) can lead to an incorrect reading, an error known as parallax error. Keeping your eyes level ensures accuracy.

****

NODIA

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

initial volume from the final volume, she correctly determines that the volume of the stone is 5 mL.

Questions:

1. What is the volume of the water displaced by the stone in this activity?
2. What is the volume of the stone in cubic centimeters (cm^3)?
3. Why is this water displacement method necessary for objects like a stone but not for a regularly shaped object like a dice?

Ans :

1. The volume of water displaced is 5 mL (55 mL – 50 mL).
2. The volume of the stone is 5 cm^3 (since 1 mL = 1 cm^3).
3. The volume of a regularly shaped object can be calculated using a formula (e.g., Volume = l × w × h). This method is for objects with irregular shapes where such measurements are not possible.

191. A student places a raw egg in a glass of tap water, and it sinks. This shows that the density of the egg is greater than the density of the water. His teacher then challenges him to make the egg float. By dissolving a large amount of salt in the water, he increases the density of the water, and the egg eventually floats.

Questions:

1. How is density defined?
2. Why did the egg sink in the tap water initially?
3. How did adding salt to the water make the egg float?

Ans :

1. Density is defined as the mass present in a unit volume of a substance (Density = Mass / Volume).
2. The egg sank because its density was greater than the density of the tap water.
3. Adding salt increased the mass of the solution without significantly changing the volume, thereby increasing the water's density. The egg floated once the water's density became greater than the egg's density.

192. A hot air balloon rises because the air inside it is heated, making it less dense than the cooler air outside. Heating causes the air particles inside to spread out, increasing the volume without changing the mass. Since density equals mass divided by volume, the increased volume leads to a decrease in the density of the hot air, causing it to float upwards.

Questions:

1. How does the density of a substance generally change with heating?
2. Explain why the air inside a hot air balloon becomes less dense when heated.
3. Based on this principle, what happens to cool, dense air in the atmosphere in relation to warm, less dense air?

Ans :

1. Generally, the density of a substance decreases with heating.
2. Heating increases the volume of the air as its particles spread out. Since density is mass divided by volume, an increase in volume causes the density to decrease.
3. Cool, dense air sinks while warm, less dense air rises. This principle is fundamental to processes like wind formation.

193. Aquatic animals like fish are able to breathe because gases, including oxygen, dissolve in water. However, the solubility of gases in water is affected by temperature. The chapter explains that the solubility of gases generally decreases as the temperature increases. This is why more oxygen can dissolve in cold water, ensuring sufficient oxygen for aquatic life in colder regions.

Questions:

1. How do aquatic animals get the oxygen they need to survive?
2. How does an increase in water temperature affect the amount of oxygen that can dissolve in it?
3. Why might an increase in water temperature due to pollution or climate change be dangerous for fish and other aquatic organisms?

Ans :

1. They breathe the oxygen that is dissolved in the water.
2. An increase in water temperature decreases the solubility of oxygen.
3. Warmer water holds less dissolved oxygen, which could lead to insufficient oxygen levels for fish and other aquatic life to survive, potentially harming the ecosystem.

194. In the making of Indian sweets like Gulab Jamun, a large amount of sugar is dissolved in a small amount of water to create a thick syrup called chashni. Although the mass of the sugar (solute)

Downloaded from www.pdf.tube

is much greater than the mass of the water (solvent), water is still considered the solvent because the final mixture is in a liquid state.

Questions:

1. What is a solution called that has a large amount of solute in a fixed quantity of solvent?
2. In the case of chashni, which component is the solute and which is the solvent?
3. Why is water still considered the solvent in sugar syrup, even when it is present in a smaller amount than sugar?

Ans :

1. It is called a concentrated solution.
2. The sugar is the solute, and the water is the solvent.
3. In a mixture of a solid and a liquid that forms a liquid solution, the liquid component (water) is generally considered the solvent regardless of the amount.

195. Air is a common example of a gaseous solution. It is a uniform mixture of several gases. Since nitrogen is present in the largest amount (about 78%), it is considered the solvent. Other gases present in smaller amounts, like oxygen, argon, and carbon dioxide, are considered the solutes. This shows that solutions can exist in gaseous form, not just liquid.

Questions:

1. In the gaseous solution of air, which gas is considered the solvent?
2. Name two gases that are considered solutes in the air.
3. How is the rule for determining the solvent in a gaseous solution similar to the rule for a solution of two liquids?

Ans :

1. Nitrogen is considered the solvent.
2. Oxygen and carbon dioxide are considered solutes.
3. In both cases, the substance present in the larger amount is generally considered the solvent.

196. A student needs to measure the mass of a small stone using a digital weighing balance. First, she switches on the balance and presses the "tare" button to set the reading to zero. She then places a watch glass on the pan, presses "tare" again, and finally places the stone on the watch glass to get its exact mass.

Questions:

1. What instrument is used to measure the mass of an object?
2. Why did the student press the "tare" button after placing the watch glass on the pan?
3. Is the digital balance truly measuring mass or is it measuring weight and converting it to mass units?

Ans :

1. An instrument used to measure mass is known as a balance.
2. Pressing "tare" resets the display to zero, so that the reading shown will be only the mass of the stone, not the combined mass of the stone and the watch glass.
3. Most balances actually measure weight, but their scales are marked in mass units (grams or kilograms), so they show the corresponding mass value for use on Earth.

197. A student observes ice cubes floating in a glass of water. This is unusual because most substances become denser when they turn solid. However, water has a special property : when it freezes into ice, its particles arrange in a way that takes up more space. This increase in volume makes ice less dense than liquid water, causing it to float.

Questions:

1. Why does ice float on water?
2. When water turns into ice, what happens to its volume and density?
3. How is this unique property of water important for the survival of aquatic animals in extremely cold weather?

Ans :

1. Ice floats because it is less dense (lighter) than liquid water.
2. Its volume increases, and its density decreases.
3. Because ice floats, it forms an insulating layer on top of lakes and oceans, keeping the water underneath from freezing solid and allowing fish and other creatures to survive.

198. A student has a small aluminium block. She measures its mass on a digital balance and finds it is 27 g. She then finds its volume using the water displacement method and determines it is 10 cm^3. Using the formula Density = Mass/Volume, she calculates the density of aluminium to be 2.7 g/cm^3, which is 2.7 times denser than water.

NODIA

Questions:

1. What is the mathematical formula for density?
2. Calculate the density of the aluminium block based on the provided values.
3. The relative density of aluminium is 2.7. What does this number tell you about how aluminium will behave in water?

Ans :

1. The formula is Density = Mass / Volume.
2. Density = 27 g/10 cm^3 = 2.7 g/cm^3.
3. A relative density greater than 1 means the substance is denser than water. Therefore, the aluminium block will sink in water.

199. A student needs to measure exactly 70 mL of water. In the lab, she finds measuring cylinders with capacities of 50 mL, 100 mL, and 250 mL. She realizes that using the 50 mL cylinder would require two steps. Using the 250 mL cylinder would be less accurate. She correctly chooses the 100 mL measuring cylinder as the best choice for this measurement.

Questions:

1. What is a measuring cylinder used for?
2. Why was the 50 mL measuring cylinder not a convenient choice for measuring 70 mL?
3. Why is the 100 mL cylinder a better choice than the 250 mL cylinder for measuring 70 mL accurately?

Ans :

1. A measuring cylinder is an apparatus used to measure the volume of liquids.
2. It was not convenient because she could not measure 70 mL in a single step and would have to measure twice (e.g., 50 mL + 20 mL).
3. Smaller capacity measuring cylinders usually have smaller divisions, allowing for a more accurate reading. The 100 mL cylinder's scale is more precise for a 70 mL measurement than the larger 250 mL cylinder.

200. A student mixes sawdust and sand in a glass of water. She observes that this is a non-uniform mixture because the components can be clearly seen. She also notices that the sawdust floats on the surface of the water, while the sand sinks to the bottom. This happens because sawdust is less dense than water, whereas sand is denser than water.

Questions:

1. Why is the mixture of sawdust, sand, and water considered non-uniform?
2. Why does the sand sink to the bottom of the glass?
3. Based on this observation, what can you conclude about the density of sawdust compared to the density of water?

Ans :

1. It is a non-uniform mixture because the different components can be seen either with the naked eye or with a magnifying device.
2. The sand sinks because it is denser than water.
3. You can conclude that the density of sawdust is less than the density of water, which is why it floats.

Download INDIA's Best Study app NODIA

201. A science teacher explains how pressure affects the density of different states of matter. For gases, increasing pressure forces the particles closer together, decreasing the volume and thus increasing the density. However, for liquids and solids, which are nearly incompressible, the effect of pressure on their density is usually negligible because their particles are already very close.

Questions:

1. For which state of matter does pressure primarily affect density?
2. What happens to the volume and density of a gas when pressure is increased?
3. Why does pressure have a negligible effect on the density of solids and liquids?

Ans :

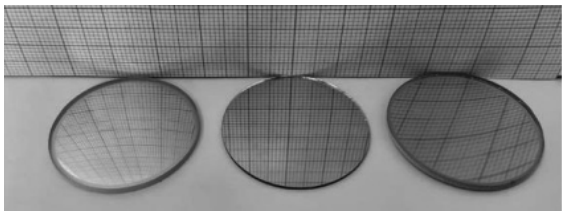
1. Pressure primarily affects the density of gases.
2. The volume of the gas decreases, and its density increases.
3. The effect is negligible because the particles in solids and liquids are already very close to each other, so they are nearly incompressible.

202. A student is carefully measuring 50 mL of water in a 100 mL measuring cylinder. She notices that the surface of the water is curved downwards. Her teacher tells her this curved surface is called the meniscus. To get an accurate reading, the teacher instructs her to position her eyes at the same level as the bottom of the meniscus.

Click Here to Buy book on Amazon

Image	Lens/Glass Type
(i)	Flat transparent glass piece (The image is of the same size as the object)
(ii)	Convex lens (The image is erect and enlarged when the object is close)
(iii)	Concave lens (The image is always erect and diminished in size)

5. Three mirrors-plane, concave and convex are placed in Figure On the basis of the images of the graph sheet formed in the mirrors, identify the mirrors and write their names above the mirrors.



Ans :

First Mirror (from left) : Convex mirror. The image of the graph sheet is diminished and the field of view is wider.
Second Mirror (middle) : Plane mirror. The image of the graph sheet is of the same size and is not distorted.
Third Mirror (right) : Concave mirror. The image of the graph sheet is enlarged.

6. In a museum, a woman walks towards a large convex mirror (Figure). She will see that :

(i) Her erect image keeps decreasing in size.
(ii) Her inverted image keeps decreasing in size.
(iii) Her inverted image keeps increasing in size and eventually it becomes erect and magnified.
(iv) Her erect image keeps increasing in size.

Ans :

(iv) Her erect image keeps increasing in size.
A convex mirror always forms an erect and diminished image. As the object moves farther away from a convex mirror, the image size decreases. Conversely, as the woman (object) moves towards the mirror, her erect image will increase in size.

7. Hold a magnifying glass over text and identify the distance where you can see the text bigger than they are written. Now move it away from the text. What do you notice? Which type of lens is a magnifying glass?

Ans :

When a magnifying glass is held close to the text, the letters appear bigger. As the magnifying glass is moved away from the text, the image becomes inverted. A magnifying glass is a convex lens.

Download INDIA's Best Study app NODIA

8. When the light is incident along the normal on the mirror, which of the following statements is true :
(i) Angle of incidence is 90°
(ii) Angle of incidence is 0°
(iii) Angle of reflection is 90°
(iv) No reflection of light takes place in this case

NODIA

Ans :

(ii) Angle of incidence is 0°
The angle of incidence is the angle between the incident ray and the normal. When the incident ray falls along the normal, this angle is 0°.

9. Match the entries in Column I with those in Column II.

	Column I		Column II
(i)	Concave mirror	(a)	Spherical mirror with a reflecting surface that curves inwards.
(ii)	Convex mirror	(b)	It forms an image which is always erect and diminished in size.
(iii)	Convex lens	(c)	Object placed behind it may appear inverted at some distance.
(iv)	Concave lens	(d)	Object placed behind it always appears diminished in size.

Ans :

CHAPTER 10

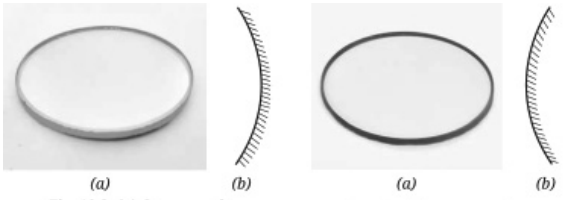
LIGHT : MIRRORS AND LENSES

SUMMARY

1. SPHERICAL MIRRORS

Spherical mirrors are curved mirrors shaped like a part of a hollow sphere.

1. **Concave Mirror :** The reflecting surface is curved inwards, like the inside of a spoon.
2. **Convex Mirror :** The reflecting surface is curved outwards(bulges out), like the back of a spoon.



(a) Concave mirror; (b) Its representation
(a) Convex mirror ; (b) Its representation

1.1 Image Formation by Spherical Mirrors

1. Concave Mirror:
   (i) When an object is placed close to the mirror, the image formed is erect(upright) and enlarged(magnified).
   (ii) When the object is moved farther away, the image becomes inverted(upside down) and can be either enlarged or smaller depending on the distance.
2. Convex Mirror : The image formed is always erect and diminished(smaller than the object), regardless of the object's distance.

1.2 Uses of Concave and Convex Mirrors

1. Concave Mirrors are used:
   (i) As reflectors in torches and vehicle headlights to create a strong, parallel beam of light.
   (ii) By dentists to get an enlarged view of teeth.

NODIA

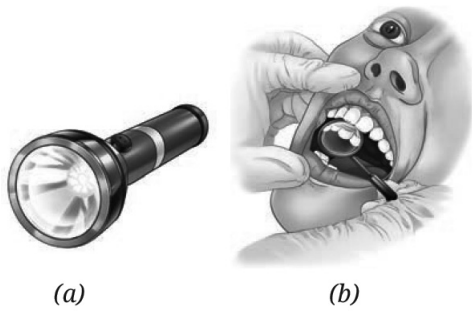


Figure Use of concave mirror (a) As a reflector of a torch; (b) By a dentist

   (iii) In reflecting telescopes.

Download INDIA's Best Study app NODIA

2. Convex Mirrors are used:
   (i) As side-view mirrors on vehicles because they provide a wider field of view and always show an erect image.

Side-view mirror

   (ii) As security mirrors in large stores and at sharp road bends for safety.

Download INDIA's Best Study app NODIA

186. Discuss the significance of water's role as a "universal solvent" by citing examples from both nature and traditional Indian medicine.

Ans :

Water is often called the "universal solvent" because it can dissolve more substances than any other liquid.

- **In Nature** : This property is vital for life. It transports nutrients in the soil to plants and carries essential minerals in the bloodstreams of animals. Aquatic ecosystems exist because gases like oxygen can dissolve in water.
- **In Traditional Medicine** : Systems like Ayurveda have long utilized water as a primary solvent. It is used to prepare medicinal formulations by extracting active compounds from herbs and other natural substances, making the therapeutic benefits of these materials accessible to the body.

187. Design a simple experiment to compare the densities of three common liquids : water, cooking oil, and vinegar.

Ans :

This experiment can be designed to compare densities by observing how the liquids layer and by direct measurement.

- **Layering Method** : Pour equal amounts of all three liquids into a tall, clear glass. The liquids will settle into layers based on their density, with the densest at the bottom and the least dense at the top. This provides a visual, qualitative comparison.
- **Quantitative Method** : Measure the mass of exactly 100 mL of each liquid using a measuring cylinder and a digital balance. For each liquid, calculate its density using the formula

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}.$$

The liquid with the highest calculated value is the densest.

CASE BASED QUESTIONS

188. A student prepares a homemade Oral Rehydration Solution (ORS) by mixing salt and sugar in water. After stirring, the salt and sugar dissolve completely, creating a uniform mixture where the components are evenly distributed. Every sip of the solution tastes the same. This type of uniform mixture is called a solution, with water as the solvent and sugar/salt as solutes.

Questions:

1. What is a uniform mixture, such as salt or sugar in water, called?
2. In the ORS drink, identify the solute(s) and the solvent.
3. If the student had mixed sand in water instead, would it be considered a solution? Explain why or why not.

Ans :

1. A uniform mixture is called a solution.
2. The solutes are the salt and sugar, and the solvent is the water.
3. No, it would be a non-uniform mixture. Sand does not dissolve in water, so its components would not be evenly distributed and would be visible.

189. A student keeps adding salt to a glass of water at room temperature, stirring after each spoonful. Initially, the salt dissolves easily. After adding four spoons, no more salt will dissolve, and the excess settles at the bottom. The student has now created a saturated solution, meaning the water cannot dissolve any more salt at that specific temperature.

Questions:

1. What is a solution called when it can no longer dissolve any more solute at a given temperature?
2. Before the salt started settling, when it was still dissolving, what type of solution was it?
3. Based on the information in the chapter, what could the student do to dissolve the salt that has settled at the bottom?

Ans :

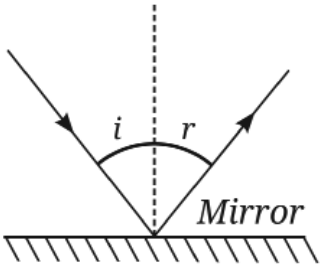
1. It is called a saturated solution.
2. It was an unsaturated solution, as more solute could still be dissolved.
3. She could heat the solution. The chapter states that for most substances, solubility increases with an increase in temperature.

190. To find the volume of an irregularly shaped stone, a student uses the displacement method. She pours 50 mL of water into a measuring cylinder. After carefully lowering the stone into the water, the water level rises to 55 mL. By subtracting the

Downloaded from www.pdf.tube

NCERT EXERCISE

1. A light ray is incident on a mirror and gets reflected by it . The angle made by the incident ray with the normal to the mirror is 40°. What is the angle made by the reflected ray with the mirror?



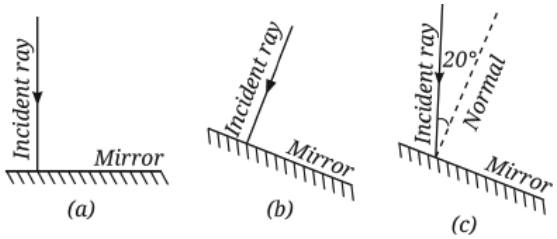
(i) 40°
(ii) 50°
(iii) 45°
(iv) 60°

Ans :

(ii) 50°
According to the law of reflection, the angle of incidence is equal to the angle of reflection. Therefore, the angle of reflection is 40°. The normal is at an angle of 90° to the mirror's surface. Thus, the angle made by the reflected ray with the mirror is 90° – 40° = 50°.

Download INDIA's Best Study app NODIA

2. Figure shows three different situations where a light ray falls on a mirror.
(i) The light ray falls along the normal
(ii) The mirror is tilted, but the light ray still falls along the normal to the tilted surface.
(iii) The mirror is tilted, and the light ray falls at an angle of 20° from the normal.



Draw the reflected ray in each case (Use a ruler and protractor for accurate drawing). What is the angle of reflection in each case?

Ans :

3. In Figure the cap of a sketch pen is placed in front of three types of mirrors. Match each image with the correct mirror.

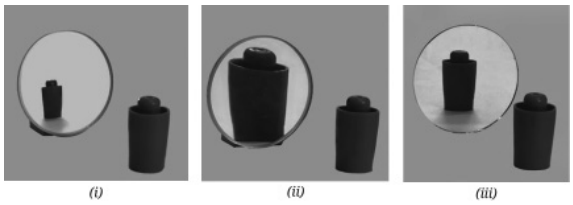


Image	Mirror
(i)	Plane mirror
(ii)	Convex mirror
(iii)	Concave mirror

Ans :

Image	Mirror
(i)	Plane mirror (Image is erect and of the same size as the object)
(ii)	Convex mirror (Image is always erect and diminished in size)
(iii)	Concave mirror (Image is erect and enlarged when the object is placed close to it)

Download INDIA's Best Study app NODIA

4. In Figure the cap of a sketch pen is placed behind a convex lens, a concave lens, and a flat transparent glass piece - all at the same distance. Match each image with the correct type of lens or glass.

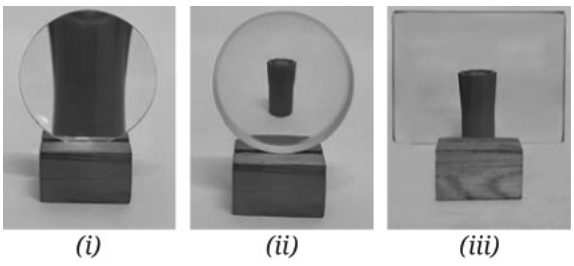
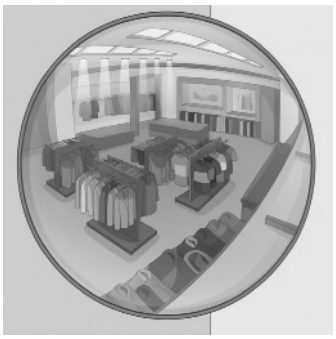


Image	Lens/Glass Type
(i)	Flat transparent glass piece
(ii)	Convex lens
(iii)	Concave lens

Ans :

NODIA



Road safety mirror

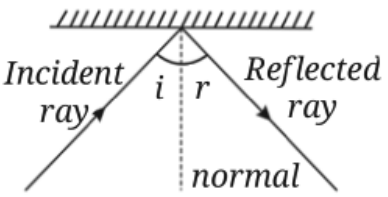
1.3 Key Terms related to reflection

1. Incident Ray : The ray of light that strikes the mirror.
2. Reflected Ray : The ray of light that bounces back from the mirror.
3. Normal : An imaginary line drawn perpendicular (at 90°) to the mirror's surface at the point where the incident ray hits.
4. Angle of Incidence ($\angle i$) : The angle between the incident ray and the normal.
5. Angle of Reflection ($\angle r$) : The angle between the reflected ray and the normal.

1.4 Law of reflection

The two laws of reflection are:

1. The angle of incidence is always equal to the angle of reflection ($\angle i = \angle r$).



Angle of incidence and angle of reflection

2. The incident ray, the reflected ray, and the normal all lie in the same plane.

These laws apply to all types of mirrors, including plane, concave, and convex mirrors.

1.5 Reflection of Parallel Rays by Mirrors

1. A concave mirror causes parallel rays of light to come together, or converge.
2. A convex mirror causes parallel rays of light to spread out, or diverge.
3. Because concave mirrors can focus light to a single point, they are used in solar concentrators to generate heat.

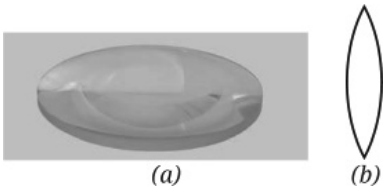
2. LENSES

A lens is a piece of transparent material, like glass, with at least one curved surface. Light passes through a lens instead of reflecting off it.

2.1 Types of Lens

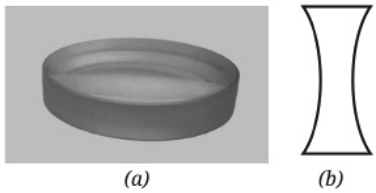
The lens is classified in the following types :

1. Convex Lens : It is thicker in the middle and thinner at the edges.



(a) A convex lens; (b) Its representation

2. Concave Lens : It is thinner in the middle and thicker at the edges.



(a) A concave lens; (b) Its representation

2.2 Image Formation by Lenses

1. Convex Lens : When an object is close, it forms an erect and enlarged image (this is how a magnifying glass works). As the object moves farther away, the image becomes inverted.
2. Concave Lens : It always forms an erect and diminished image.

2.3 Action of Lenses on Light

1. A convex lens is also known as a converging lens because it brings parallel rays of light together to a point.
2. A concave lens is also known as a diverging lens because it spreads parallel rays of light out.

2.4 Uses of Lenses

Lenses are used in many optical instruments, including:

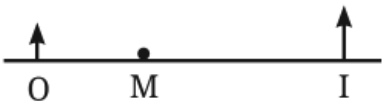
1. Eyeglasses to correct vision.
2. Cameras, microscopes, and telescopes.
3. The human eye itself contains a convex lens.

Click Here to Buy book on Amazon

	Column I		Column II
(i)	Concave mirror	(a)	Spherical mirror with a reflecting surface that curves inwards.
(ii)	Convex mirror	(b)	It forms an image which is always erect and diminished in size.
(iii)	Convex lens	(c)	Object placed behind it may appear inverted at some distance.
(iv)	Concave lens	(d)	Object placed behind it always appears diminished in size.

10. In Figure note that O stands for object, M for mirror, and I for image. Which of the following statements is true?

(a)



(b)

(i) Figure (a) indicates a plane mirror and Figure (b) indicates a concave mirror.
(ii) Figure (a) indicates a convex mirror and Figure (b) indicates a concave mirror.
(iii) Figure (a) indicates a concave mirror and Figure (b) indicates a convex mirror.
(iv) Figure (a) indicates a plane mirror and Figure (b) indicates a convex mirror.

Ans :

(iv) Figure (a) indicates a plane mirror and Figure (b) indicates a convex mirror.
In Figure (a), the image (i) is erect, of the same size as the object (O), and is formed as far behind the mirror as the object is in front of it. These are the characteristics of an image formed by a plane mirror. In Figure (b), the image (i) is erect but diminished (smaller) than the object (O), which is characteristic of an image formed by a convex mirror.

Download INDIA's Best Study app NODIA

11. Place a pencil behind a transparent glass tumbler (Figure a). Now fill the tumbler halfway with water (Figure b). How does the pencil appear when viewed through the water? Explain why its shape appears changed.

(a) (b)

Ans :

When viewed through the water, the part of the pencil immersed in water appears to be bent at the surface of the water. It also looks thicker or magnified. This apparent change in shape occurs due to the refraction of light. Light rays from the pencil travel from water (a denser medium) to air (a rarer medium) before reaching our eyes. As the light passes from water to air, it bends away from the normal, making the pencil appear bent. The curved surface of the glass tumbler filled with water acts like a convex lens, which magnifies the part of the pencil inside the water.

NODIA

12. The following question is based on Assertion/ Reason.
Assertion : Convex mirrors are preferred for observing the traffic behind us.
Reason : Convex mirrors provide a significantly larger view area than plane mirrors.
Choose the correct option:
(i) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
(ii) Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion.
(iii) Assertion is correct but Reason is incorrect.
(iv) Both Assertion and Reason are incorrect.

Ans :

(i) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.

25. Which type of lens is used as a magnifying glass?
(A) A convex lens
(B) A concave lens
(C) A plane glass sheet
(D) A bifocal lens

Ans :

(A) A convex lens
A convex lens, when held close to an object, forms a virtual, erect, and magnified image. This ability to make small objects or text appear larger is the principle behind a magnifying glass.

26. What does a concave lens do to a parallel beam of light that passes through it?
(A) It converges the light to a point.
(B) It diverges the light, making it spread out.
(C) It reflects the light back.
(D) It has no effect on the light.

Ans :

(B) It diverges the light, making it spread out.
A concave lens is thinner in the middle and thicker at the edges. This shape causes parallel light rays passing through it to bend outwards and spread apart, a process known as divergence.

27. Which of the following statements about the image formed by a plane mirror is incorrect?
(A) The image is erect.
(B) The image is of the same size as the object.
(C) The image is inverted (upside down).
(D) The image is laterally inverted.

Ans :

(C) The image is inverted (upside down).
A plane mirror always forms an image that is upright or erect. It does not invert the image vertically. The inversion that occurs is lateral, meaning the left and right sides are swapped.

28. Concave mirror is to converging light as a convex mirror is to _____.
(A) Refracting light
(B) Absorbing light
(C) Magnifying light
(D) Diverging light

Ans :

(D) Diverging light
This analogy compares the primary action of the two types of spherical mirrors on parallel light rays. A concave mirror brings the rays together (converges), while a convex mirror spreads them apart (diverges).

29. An object is placed very close to a concave mirror. As the object is slowly moved farther away, what change will be observed in the image?
(A) The image is first erect and magnified, then becomes inverted.
(B) The image remains erect and gets progressively smaller.
(C) The image is always inverted and gets progressively larger.
(D) The image is always erect and remains exactly the same size.

Ans :

(A) The image is first erect and magnified, then becomes inverted.
A concave mirror has variable image properties. When the object is very close, the image is virtual, erect, and magnified. As the object is moved past the focal point, the image becomes real and inverted, initially large and then shrinking.

30. The angle between the incident ray and the normal is called the _____.
(A) Angle of reflection
(B) Angle of incidence
(C) Angle of the mirror
(D) Normal angle

Ans :

(B) Angle of incidence
In the study of reflection, angles are measured relative to the normal (a line perpendicular to the surface). The angle of the incoming light ray, measured from this normal, is defined as the angle of incidence.

31. The reflectors in car headlights and torches are curved inwards. This shape is used because a _____ mirror can produce a powerful, parallel beam of light when the light source is placed at its focal point.
(A) Convex
(B) Plane
(C) Concave
(D) Security

Ans :

(C) Concave
A key property of a concave mirror is that light rays originating from its focal point will reflect off the mirror as a parallel beam. This principle is used in headlights and torches to direct the light forward efficiently.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

19. What is a lens?
(A) A piece of polished metal that has a single curved surface.
(B) Any type of object that is capable of forming an image.
(C) A piece of transparent material, like glass, with curved surfaces.
(D) A device that uses electricity in order to produce bright light.

Ans :

(C) A piece of transparent material, like glass, with curved surfaces.
A lens is an optical device that transmits and refracts light. It is made of a transparent material and has at least one curved surface, which allows it to converge or diverge light rays to form an image.

20. A lens that is thicker at the middle and thinner at the edges is called a _____.
(A) Concave lens
(B) Plane lens
(C) Mirror lens
(D) Convex lens

Ans :

(D) Convex lens
This describes the physical shape of a convex lens. This double-curved-outward shape is what gives the lens its property of converging parallel light rays to a single point.

21. As shown in figure what happens to parallel beams of light after they reflect from a concave mirror?

(A) They converge (come together).
(B) They remain parallel.
(C) They diverge (spread out).
(D) They are absorbed.

Ans :

(A) They converge (come together).
A concave mirror's inward-curving surface is also known as a converging mirror. It causes parallel rays of light to reflect and meet at a single point, called the focal point.

22. Which type of mirror is used by dentists to get an enlarged view of teeth?
(A) Convex mirror
(B) Concave mirror
(C) Plane mirror
(D) A combination of mirrors

Ans :

(B) Concave mirror
When a concave mirror is held very close to an object (within its focal length), it produces a magnified, erect, and virtual image. This property makes it ideal for dentists to examine teeth in detail.

23. A concave mirror can be used to focus sunlight and burn a piece of paper because it _____.
(A) Absorbs the sun's heat energy very well
(B) Acts exactly like a powerful magnifying glass
(C) Converges the sun's parallel rays to a single point
(D) Creates a chemical reaction directly on the paper

Ans :

(C) Converges the sun's parallel rays to a single point
Sunlight arrives as nearly parallel rays. The concave shape of the mirror reflects all these rays and directs them to a single focal point. This concentrates the sun's energy into a tiny, intense spot, generating enough heat to ignite paper.

24. How does the image formed by a convex mirror always differ from an object?
(A) The image is always inverted and much larger.
(B) The image is always erect and of the same size.
(C) The image is always inverted and much smaller.
(D) The image is always erect and smaller (diminished).

Ans :

(D) The image is always erect and smaller (diminished).
Regardless of the object's distance, a convex mirror consistently produces a virtual image that is upright (erect) and smaller in size than the actual object. This is why it provides a wide field of view.

NODIA

Convex mirrors are used as side-view mirrors in vehicles because, being curved outwards, they provide a much wider field of view of the road behind compared to a plane mirror of the same size.

MULTIPLE CHOICE QUESTION

13. What is a spherical mirror whose reflecting surface is curved inwards called?
(A) A concave mirror
(B) A convex mirror
(C) A plane mirror
(D) A lens

Ans :

(A) A concave mirror
A concave mirror is shaped like a part of the inside of a hollow sphere. Its reflecting surface curves away from the observer, causing it to converge parallel light rays to a focal point.

14. A spherical mirror with a reflecting surface that bulges or curves outwards is called a _____.
(A) Plane mirror
(B) A convex mirror
(C) Concave mirror
(D) Diverging lens

Ans :

(B) A convex mirror
A convex mirror has a reflecting surface that curves towards the observer, similar to the outside of a sphere. This shape causes parallel light rays to diverge or spread out after reflection.

15. When you hold the inner side of a shiny metallic spoon close to your face, what kind of image do you typically see?
(A) An erect and smaller image.
(B) An image of the same size.
(C) An inverted and enlarged image.
(D) No image is formed.

Ans :

(C) An inverted and enlarged image.
The inner, curved-inward surface of a spoon acts like a concave mirror. When an object is held beyond a certain point, a concave mirror forms a real, inverted image which may appear enlarged.

Download INDIA's Best Study app NODIA

16. Side-view mirrors on vehicles often have a warning that "Objects in mirror are closer than they appear." This is because these mirrors are _____.
(A) Concave mirrors
(B) Plane mirrors
(C) Magnifying lenses
(D) Convex mirrors

Ans :

(D) Convex mirrors
Convex mirrors are used in vehicles because they provide a wider field of view. However, they achieve this by forming an image that is smaller than the actual object, which can make the object seem farther away than it is.

17. According to the first law of reflection, what is the relationship between the angle of incidence (i) and the angle of reflection (r)?
(A) The angle of incidence is always equal to the angle of reflection.
(B) The angle of incidence is always greater than the angle of reflection.
(C) The angle of incidence is always smaller than the angle of reflection.
(D) The sum of the two angles is always equal to exactly 90 degrees.

Ans :

(A) The angle of incidence is always equal to the angle of reflection.
The first law of reflection is a fundamental principle stating that when a ray of light reflects off a surface, the angle at which it strikes the surface (angle of incidence) is exactly equal to the angle at which it bounces off (angle of reflection).

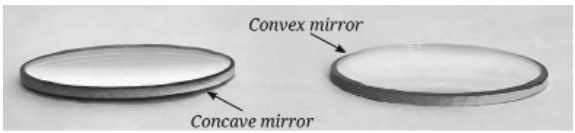
18. What three things all lie in the same plane according to the second law of reflection?
(A) The incident ray, the object, and the image.
(B) The incident ray, the normal, and the reflected ray.
(C) The mirror, the object, and the eye.
(D) The reflected ray, the normal, and the object.

Ans :

(B) The incident ray, the normal, and the reflected ray.
The second law of reflection states that the incoming light ray (incident ray), the line perpendicular to the mirror's surface at the point of incidence (the normal), and the outgoing light ray (reflected ray) all exist within the same two-dimensional plane.

Click Here to Buy book on Amazon

32. In the diagram for identifying mirrors , how can you distinguish a concave mirror from a convex one by its side view?



Identifying concave and convex mirrors from their side view

(A) The concave mirror's main reflecting surface is completely flat.
(B) The convex surface curves inwards; the concave one curves outwards.
(C) Both of the mirrors have the exact same appearance in side view.
(D) The concave surface curves inwards; the convex one curves outwards.

Ans :

(D) The concave surface curves inwards; the convex one curves outwards.
The very definition of these mirrors is based on the curvature of their reflecting surface. A side view clearly shows this curvature. A concave surface is hollowed out or curved inwards, while a convex surface bulges outwards.

33. A convex lens _____ a beam of light, while a concave lens _____ a beam of light.
(A) Converges, diverges
(B) Diverges, converges
(C) Reflects, refracts
(D) Magnifies, diminishes

Ans :

(A) Converges, diverges
The primary optical function of a convex lens is to converge (bring together) parallel rays of light to a focal point. Conversely, a concave lens causes parallel rays of light to diverge (spread apart).

34. When you see an image in a mirror, it is formed by the process of _____, whereas when you see an image through a lens, it is formed by the process of _____.
(A) Refraction, reflection
(B) Reflection, refraction
(C) Absorption, transmission
(D) Divergence, convergence

Ans :

(B) Reflection, refraction
Mirrors work by bouncing light off a coated surface, which is called reflection. Lenses are transparent and work by bending light as it passes through them from one medium to another, a process known as refraction.

35. What happens to the image formed by a convex mirror as the object is moved away from it?
(A) It becomes larger.
(B) It becomes inverted.
(C) It decreases slightly in size but remains erect.
(D) It remains the same size.

Ans :

(C) It decreases slightly in size but remains erect.
The image formed by a convex mirror is always erect and diminished. As the object moves farther away from the mirror, the image moves closer to the focal point behind the mirror and becomes even smaller.

36. How does the image formed by a concave lens always differ from the image formed by a convex lens when the object is placed far away?
(A) The concave lens forms an inverted image; the convex lens an erect one.
(B) Both the concave and the convex lenses will form erect images.
(C) Both the concave and the convex lenses will form inverted images.
(D) The concave lens forms an erect image; the convex lens an inverted one.

Ans :

(D) The concave lens forms an erect image; the convex lens an inverted one.
A concave lens always produces a virtual, erect, and diminished image, regardless of object distance. A convex lens, when the object is placed far from it (beyond the focal point), produces a real, inverted image.

37. What is the purpose of using a comb with a single thin slit and a torch in the reflection experiment?
(A) To create a single, thin beam of light (a ray).
(B) To create multiple parallel beams of light.
(C) To measure the temperature of the light.
(D) To block the light completely.

Ans :

(A) To create a single, thin beam of light (a ray).
To study the laws of reflection precisely, it is necessary to observe the path of a single, well-defined ray of light. The comb with one slit acts as an aperture, blocking most of the light from

Downloaded from www.pdf.tube

50. Our own eye contains which type of lens?
(A) A concave lens
(B) A convex lens
(C) A plane glass lens
(D) A mirror

Ans :

(B) A convex lens
The human eye has a natural, flexible convex lens. It works by focusing light from the outside world onto the retina at the back of the eye, forming an image that the brain can process.

51. Which of the following is an INCORRECT use for a convex mirror?
(A) As a side-view mirror on the side of a car.
(B) As a security mirror in the corner of a large shop.
(C) As a shaving mirror that provides a magnified image.
(D) As a safety mirror located at a sharp road bend.

Ans :

(C) As a shaving mirror that provides a magnified image.
Convex mirrors always produce diminished (smaller) images. For a magnified image, such as that needed for shaving or applying makeup, a concave mirror must be used by placing the face close to it.

52. A ray is to a beam of light as a _____ is to a _____.
(A) Mirror, lens
(B) Reflection, refraction
(C) Torch, comb
(D) Single line, collection of lines

Ans :

(D) Single line, collection of lines
In optics, a 'ray' is an idealized narrow line representing the path of light. A 'beam' is a broader stream of light that can be thought of as a collection of many parallel or diverging/converging rays.

53. The phenomenon of lateral inversion seen in a plane mirror means that _____.
(A) The right side appears as the image's left side
(B) The image is completely upside down
(C) The image is much smaller than the object
(D) The image is formed somewhere behind the mirror

Ans :

(A) The right side appears as the image's left side
Lateral inversion is the apparent left-right reversal of an image in a plane mirror. It's why text appears backwards when viewed in a mirror. The image is not flipped vertically, only horizontally.

54. A student wants to form an image on a piece of paper using sunlight and a single optical device. Which two devices could be used for this task?
(A) A plane mirror and a convex mirror.
(B) A concave mirror and a convex lens.
(C) A convex mirror and a concave lens.
(D) A plane mirror and a concave lens.

Ans :

(B) A concave mirror and a convex lens.
To form an image on a screen or paper (a real image), the light rays must actually converge at that point. Both a concave mirror (by reflection) and a convex lens (by refraction) are converging devices capable of focusing sunlight to a point.

55. An object viewed through a concave lens always appears smaller. This is because the lens _____.
(A) Absorbs some of the light
(B) Reflects most of the light
(C) Diverges the light rays coming from the object
(D) Is thicker in the middle

Ans :

(C) Diverges the light rays coming from the object
A concave lens spreads out the light rays that pass through it. When our eye and brain trace these diverging rays back to an apparent point of origin, they form a virtual image that is smaller than the actual object.

56. Telescopes, microscopes, and cameras all rely on which components to form images?
(A) A series of plane mirrors.
(B) Electromagnets and electric circuits.
(C) Flat sheets of transparent plastic.
(D) Lenses (or a combination of lenses and mirrors).

Ans :

(D) Lenses (or a combination of lenses and mirrors).
These are all optical instruments that work by manipulating light to create a specific type of image (magnified, focused on a sensor, etc.). Their core components are lenses and, in the case of reflecting telescopes, curved mirrors.

NODIA

the law of reflection, the angle of reflection must also be 0 degrees, so the ray reflects straight back along the same path.

45. An image formed by a concave mirror can be _____, while an image formed by a convex mirror is always _____.
(A) Erect or inverted, always erect
(B) Always erect, always inverted
(C) Always inverted, erect or inverted
(D) Diminished only, magnified only

Ans :

(A) Erect or inverted, always erect
Concave mirrors have versatile image-forming properties, producing erect images when the object is close and inverted images when it is far. Convex mirrors, however, are consistent and always produce erect images regardless of object distance.

46. Why does placing a water drop on an oiled plastic strip make the text below it appear larger?
(A) The oil that is on the plastic strip magnifies the text.
(B) The water drop forms a curved surface that acts like a convex lens.
(C) The plastic strip itself bends, bringing the text much closer.
(D) The water chemically alters the ink that is on the paper.

Ans :

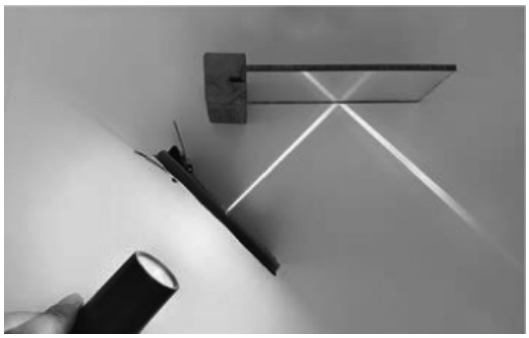
(B) The water drop forms a curved surface that acts like a convex lens.
Due to surface tension, the water drop forms a shape that is thicker in the middle and thinner at the edges, exactly like a convex lens. This shape causes it to refract light rays from the text, magnifying them.

47. To get a parallel beam of light from a flashlight, where should the small bulb be placed with respect to the concave reflector?
(A) Very far from the reflector.
(B) Very close to the reflector.
(C) At the focal point of the reflector.
(D) Behind the reflector.

Ans :

(C) At the focal point of the reflector.
A concave mirror has the property that any light ray originating from its focal point will be reflected parallel to the principal axis. Placing the bulb at this specific point ensures that the reflected light forms a strong, directed, parallel beam.

48. In the experiment shown in Figure (b), where a beam is passed through an extended paper sheet, what does the fact that the reflected beam disappears when the paper is bent demonstrate?



(A) The angle of incidence is not equal to the angle of reflection.
(B) Light is not able to travel through any piece of bent paper.
(C) The mirror will stop reflecting light when the paper is bent.
(D) The incident ray, normal, and reflected ray lie in the same plane.

Ans :

(D) The incident ray, normal, and reflected ray lie in the same plane.
When the paper is flat, it represents a single plane, and the reflected ray is visible on it. Bending the paper moves that part of the surface into a different plane. The reflected ray does not bend with it and becomes invisible, proving it stays in the original plane.

49. A convex lens is also known as a _____ lens, while a concave lens is known as a _____ lens.
(A) Converging, diverging
(B) Diverging, converging
(C) Reflecting, refracting
(D) Refracting, reflecting

Ans :

(A) Converging, diverging
These names describe the primary effect each lens has on parallel light rays. A convex lens brings the rays together, so it is a converging lens. A concave lens spreads the rays apart, so it is a diverging lens.

Download INDIA's Best Study app NODIA

Click Here to Buy book on Amazon

the torch and allowing only a narrow beam to pass through.

38. The imaginary line drawn at 90° to the surface of a mirror at the point where an incident ray strikes is called the _____.
(A) Incident ray
(B) Normal
(C) Reflected ray
(D) Angle of reflection

Ans :

(B) Normal
The normal is a crucial reference line used for measuring angles in optics. It is always drawn perpendicular (at a right angle) to the reflecting surface at the exact point where the light ray hits the mirror.

39. Which of the following statements about lenses is incorrect?
(A) A convex lens is thicker in the middle.
(B) A concave lens is also called a diverging lens.
(C) Lenses work by reflecting light.
(D) Eyeglasses and cameras use lenses.

Ans :

(C) Lenses work by reflecting light.
Lenses are transparent optical devices that work by refracting light, which is the bending of light as it passes through the lens material. Reflection is the principle by which mirrors work.

40. A student looks at the text in a book through a lens and sees the letters as erect and smaller than they actually are. What type of lens is the student using?
(A) A convex lens
(B) A plane glass sheet
(C) A concave mirror
(D) A concave lens

Ans :

(D) A concave lens
A concave lens is a diverging lens, and it always produces a virtual, erect, and diminished (smaller) image of an object, regardless of how far the object is from the lens.

41. Water drop is to simple lens as shiny spoon is to _____.
(A) Curved mirror
(B) Plane mirror
(C) Transparent glass
(D) Light source

Ans :

(A) Curved mirror
The chapter introduces the concepts using everyday objects. A small, curved water drop acts like a simple lens by refracting light. Similarly, the curved surface of a shiny spoon acts as a spherical or curved mirror by reflecting light.

42. The laws of reflection are valid for which types of mirrors?
(A) Only for plane mirrors.
(B) For all kinds of mirrors, including plane and spherical.
(C) Only for spherical mirrors.
(D) Only for convex mirrors.

Ans :

(B) For all kinds of mirrors, including plane and spherical.
The two fundamental laws of reflection (angle of incidence equals angle of reflection, and all rays lie in the same plane) apply to any reflection of light from a surface, regardless of whether that surface is flat or curved.

43. What is the primary purpose of surveillance mirrors placed in the corners of large stores?
(A) To magnify the images of products for customers.
(B) To reflect light and make the store brighter.
(C) To provide a wide-angle view of the store for monitoring.
(D) To check for dust on high shelves.

Ans :

(C) To provide a wide-angle view of the store for monitoring.
These mirrors are large convex mirrors. Their curved-outward shape allows them to reflect light from a very wide area, providing a panoramic but diminished view of the store, which is ideal for security and surveillance.

44. If a ray of light strikes a plane mirror along the normal, what will be the angle of reflection?
(A) 90 degrees
(B) 45 degrees
(C) 180 degrees
(D) 0 degrees

Ans :

(D) 0 degrees
The angle of incidence is measured between the incident ray and the normal. If the ray travels along the normal, this angle is 0 degrees. According to

NODIA

57. A smooth, shiny surface like a mirror produces a clear image due to _____, while a rough surface scatters light in many directions due to _____.
(A) Regular reflection, diffuse reflection
(B) Diffuse reflection, regular reflection
(C) Refraction, absorption
(D) Convergence, divergence

Ans :

(A) Regular reflection, diffuse reflection
On a smooth surface, parallel incident rays are reflected as parallel rays, preserving the image. This is regular (or specular) reflection. A rough surface reflects the rays in many different directions, scattering the light and not forming a clear image. This is diffuse reflection.

58. Which statement about the image formed by a concave lens is incorrect?
(A) The image is always erect.
(B) The image can be erect or inverted depending on the object's distance.
(C) The image is always diminished.
(D) The image is virtual.

Ans :

(B) The image can be erect or inverted depending on the object's distance.
A concave lens consistently produces the same type of image regardless of where the object is placed. The image is always virtual (cannot be projected on a screen), erect (upright), and diminished (smaller than the object).

59. The angle of reflection is the angle between the reflected ray and the _____.
(A) Mirror surface (B) Incident ray
(C) Normal (D) Object

Ans :

(C) Normal
Just like the angle of incidence, the angle of reflection is measured with respect to the normal. The normal is the line drawn perpendicular to the mirror surface at the point where the light ray is reflected.

60. Both a concave mirror and a convex lens are 'converging' devices. A key difference is that the mirror converges by _____, and the lens converges by _____.
(A) Refraction, reflection
(B) Absorption, transmission
(C) Transmission, absorption
(D) Reflection, refraction

Ans :

(D) Reflection, refraction
Although their effect on parallel light is similar (convergence), the physical process is different. The concave mirror is a reflective surface that bounces light rays to a focal point. The convex lens is a transparent medium that bends light rays inward as they pass through it.

61. A ray of light is directed at a plane mirror such that the angle between the ray and the mirror surface is 30°. What is the angle of reflection?
(A) 60°
(B) 30°
(C) 90°
(D) 120°

Ans :

(A) 60°
The angle of incidence is measured from the normal, which is 90° to the mirror. If the angle with the mirror is 30°, then the angle of incidence is 90° – 30° = 60°. By the law of reflection, the angle of reflection is also 60°.

62. A girl stands 2 meters in front of a large plane mirror. How far behind the mirror does her image appear to be?
(A) 1 meter
(B) 2 meters
(C) 4 meters
(D) The image is on the surface of the mirror.

Ans :

(B) 2 meters
A property of a plane mirror is that it forms a virtual image that appears to be located at the same distance behind the mirror as the object is in front of it.

63. A lens that is thinner at the middle and thicker at the edges is called a _____.
(A) Convex lens
(B) Bifocal lens
(C) Concave lens
(D) Plane lens

Ans :

(C) Concave lens
This describes the physical shape of a concave lens. This double-curved-inward shape is what gives the lens its characteristic property of diverging parallel light rays.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

64. The image formed by a _____ mirror is always diminished, and the image formed by a _____ lens is also always diminished.
(A) Concave, convex
(B) Plane, convex
(C) Convex, plane
(D) Convex, concave

Ans :

(D) Convex, concave
Both convex mirrors and concave lenses are diverging optical devices. As a result, they both consistently produce images that are smaller (diminished) than the object.

65. An image is described as 'virtual'. What does this mean?
(A) The image is formed by rays that do not actually meet.
(B) The image is always going to be completely inverted.
(C) The image is always much smaller than the original object.
(D) The image is only formed by using concave types of mirrors.

Ans :

(A) The image is formed by rays that do not actually meet.
A virtual image is an optical illusion. It is formed at a location where light rays appear to diverge from. Since the rays don't actually converge there, the image cannot be captured on a physical screen.

66. In large reflecting telescopes, what type of mirror is used as the main objective to collect light from distant stars?
(A) A large convex mirror
(B) A large concave mirror
(C) A series of small plane mirrors
(D) A large flat mirror

Ans :

(B) A large concave mirror
The primary goal of a telescope is to gather as much light as possible. A large concave mirror is used because it can collect light from a wide area and focus it to a point, allowing faint and distant objects to be seen.

67. If you look at the outer, bulging side of a shiny spoon, your image is erect but smaller. This surface is acting as a _____.
(A) Plane mirror (B) Concave mirror
(C) Convex mirror (D) Convex lens

Ans :

(C) convex mirror
The outward-curving surface of the spoon reflects light in the same way as a convex mirror. This type of mirror always produces a virtual, erect, and diminished image, which matches the observation.

68. Which of the following is an INCORRECT pairing of an optical device and its primary function?
(A) Concave mirror - Converges reflected light.
(B) Convex mirror - Diverges reflected light.
(C) Concave lens - Diverges refracted light.
(D) Convex lens - Diverges refracted light.

Ans :

(D) Convex lens - Diverges refracted light.
A convex lens is a converging lens. Its shape causes parallel rays of light that pass through it (refract) to bend inward and converge at a focal point.

69. Torch reflector is to concave mirror as magnifying glass is to _____.
(A) Convex lens
(B) Concave lens
(C) Convex mirror
(D) Plane mirror

Ans :

(A) Convex lens
This analogy connects a common application to the specific type of optical device used. The reflector in a torch is a concave mirror used to create a beam. A magnifying glass is a convex lens used to create an enlarged image.

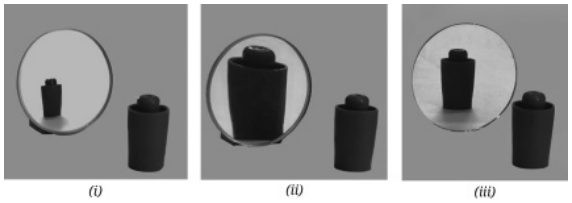
70. In a dark room, a student shines a thin beam of light onto a mirror and sees the reflected beam on the ceiling. If the student tilts the mirror downwards, where will the reflected beam move?
(A) It will move downwards.
(B) It will move upwards.
(C) It will not move.
(D) It will disappear.

Ans :

(B) It will move upwards.
According to the law of reflection, when the mirror is tilted by a certain angle, the reflected ray moves by twice that angle. Tilting the mirror surface down increases the angle of incidence, which in turn increases the angle of reflection, causing the reflected beam to move upwards.

NODIA

71. Figure shows three images of a pen cap in three different mirrors. The image that is erect and larger than the object (ii) must have been formed by which mirror?



(A) Plane mirror
(B) Convex mirror
(C) Concave mirror
(D) It is impossible to tell.

Ans :

(C) Concave mirror
Only a concave mirror can produce an image that is both erect (upright) and magnified. This occurs when the object is placed very close to the mirror, within its focal length.

72. Solar concentrators and solar furnaces use mirrors to concentrate sunlight. What type of mirror is used for this purpose?
(A) Plane mirrors
(B) Convex mirrors
(C) A mix of all three types.
(D) Concave mirrors

Ans :

(D) Concave mirrors
To concentrate sunlight, a device is needed that can gather parallel sun rays and focus them onto a small area. Concave mirrors are converging mirrors that are perfectly suited for this task, as they reflect all parallel rays to a single focal point.

73. Eyeglasses used to correct farsightedness (difficulty seeing close objects) need to converge light rays more strongly before they enter the eye. What type of lens would be used?
(A) Convex lens
(B) Concave lens
(C) Plane glass
(D) Bifocal lens with a concave top

Ans :

(A) Convex lens
Farsightedness occurs when the eye does not bend light enough to focus on the retina. A converging lens, which is a convex lens, is used to bend the light rays inward before they reach the eye, helping it to focus correctly.

74. When an object is placed very far from both a concave mirror and a convex lens, what is a key similarity in the images formed?
(A) Both images are erect.
(B) Both images are inverted.
(C) Both images are virtual.
(D) Both images are the same size as the object.

Ans :

(B) Both images are inverted.
When an object is placed far away (beyond the focal point for the lens, and beyond the center of curvature for the mirror), both of these converging devices produce a real and inverted image.

75. A ray of light passes from air into a glass lens and bends. What is this bending of light called?
(A) Reflection (B) Absorption
(C) Refraction (D) Dispersion

Ans :

(C) Refraction
Refraction is the bending of a wave, such as light, when it passes from one medium to another (e.g., from air to glass). This bending occurs because the speed of light changes as it enters the new medium.

76. A parallel beam of light is incident on a convex lens. The point where the rays meet after passing through the lens is called the _____.
(A) Center of the lens (B) Pole
(C) Normal (D) Focal point

Ans :

(D) Focal point
A convex lens is a converging lens. By definition, its principal focal point (or focus) is the specific point on the principal axis where rays that were initially parallel to the axis converge after passing through the lens.

77. Which of the following is an INCORRECT description of an image formed by a mirror or lens?
(A) A convex lens always forms an erect, magnified image.
(B) A plane mirror forms an erect, same-sized image.
(C) A convex mirror forms an erect, diminished image.
(D) A concave lens forms an erect, diminished image.

Click Here to Buy book on Amazon

Bending the paper creates a new plane. Since the reflected ray must lie in the same plane as the incident ray, it no longer falls on the bent portion.

137. How can a concave mirror be used to burn paper with sunlight?

Ans :

A concave mirror converges parallel sunrays to a single point. This concentration of light energy produces enough heat at that point to ignite paper.

138. Compare the behavior of parallel light beams after passing through a convex lens versus a concave lens.

Ans :

A convex lens converges parallel light beams, bringing them to a point, whereas a concave lens diverges the beams, causing them to spread apart.

139. What is a key difference in how we observe images in mirrors versus lenses?

Ans :

We see images "in" a mirror because light reflects off its surface, whereas we see objects "through" a lens because light passes through it.

Download INDIA's Best Study app NODIA

140. What kind of lens is inside the human eye and what is its unique ability?

Ans :

The human eye contains a convex lens. It has the amazing ability to change its shape, allowing us to focus on objects at different distances.

141. Why are reflectors in torches and car headlights concave in shape?

Ans :

The concave shape of these reflectors helps to gather the light from the bulb and project it forward as a strong, focused beam of light.

142. Why do security mirrors in large stores have a curved-outward shape?

Ans :

These are convex mirrors. Their outward curve provides a wide field of view, allowing staff to monitor a large area of the store efficiently.

SHORT ANSWER QUESTIONS

143. Describe the process of making spherical mirrors.

Ans :

Spherical mirrors are created by grinding and polishing a flat piece of glass to form a precisely curved surface. A reflective coating, such as a thin layer of aluminum, is then applied. If this coating is placed on the outer curved surface, it becomes a concave mirror. If applied to the inner surface, it creates a convex mirror.

NODIA

144. Explain the image characteristics of a concave mirror at different object distances.

Ans :

When an object is placed very close to a concave mirror, the image formed is erect and enlarged. However, as the object is moved farther away from the mirror, the image becomes inverted. Initially, this inverted image is enlarged, but its size progressively decreases as the object's distance from the mirror continues to increase, becoming smaller.

145. Detail the two laws that govern the reflection of light from any surface.

Ans :

The laws of reflection are fundamental principles in optics. The first law states that the angle of incidence is always equal to the angle of reflection. The second law states that the incident ray, the reflected ray, and the normal to the surface at the point of incidence all lie in the same geometric plane.

146. Explain why a convex mirror is called a diverging mirror, using the concept of parallel beams.

Ans :

A convex mirror is called a diverging mirror because of its effect on parallel light rays. When multiple parallel beams of light strike its outwardly curved surface, each ray reflects according to the laws of reflection. Due to the curvature, the reflected beams spread out or diverge from each other, as if originating from a point behind the mirror.

147. Describe the image seen through a convex lens as an object's distance changes.

Ans :

2	Convex Mirror	B	A transparent material that is thicker at the edges and thinner in the middle.
3	Concave Lens	C	A mirror with a reflecting surface that curves inwards.
4	Convex Lens	D	A transparent material that is thicker in the middle and thinner at the edges.

Options
(a) 1-D, 2-B, 3-A, 4-C
(b) 1-A, 2-C, 3-D, 4-B
(c) 1-C, 2-A, 3-B, 4-D
(d) 1-B, 2-D, 3-C, 4-A

Ans :

(c) 1-C, 2-A, 3-B, 4-D
A concave mirror curves inwards, while a convex mirror bulges outwards. A concave lens is thinner in the middle, whereas a convex lens is thicker in the middle.

84. Match the optical device with the typical image it forms.

	Column A		**Column B**
1	Convex Mirror	A	Can form an inverted image when the object is moved far away from it.
2	Concave Mirror	B	Forms an image that is erect and of the same size as the object.
3	Plane Mirror	C	Is always erect and diminished in size.
4	Convex Lens (as a magnifier)	D	Is erect and enlarged, acting as a magnifier.

Options
(a) 1-C, 2-A, 3-B, 4-D
(b) 1-B, 2-D, 3-A, 4-C
(c) 1-D, 2-C, 3-B, 4-A
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(a) 1-C, 2-A, 3-B, 4-D
A convex mirror always creates an erect and diminished image. A concave mirror can form an inverted image at a distance. A plane mirror forms an erect, same-sized image. A convex lens acts as a magnifier, producing an enlarged, erect image when close.

NODIA

85. Match the optical device with its action on a parallel beam of light.

	Column A		**Column B**
1	Concave Mirror	A	A diverging lens.
2	Convex Mirror	B	A converging mirror.
3	Convex Lens	C	A diverging mirror.
4	Concave Lens	D	A converging lens.

Options
(a) 1-D, 2-A, 3-C, 4-B
(b) 1-C, 2-B, 3-A, 4-D
(c) 1-B, 2-C, 3-D, 4-A
(d) 1-A, 2-D, 3-B, 4-C

Ans :

(c) 1-B, 2-C, 3-D, 4-A
Concave mirrors and convex lenses are converging. Convex mirrors and concave lenses are diverging.

86. Match the term from the laws of reflection with its correct definition.

	Column A		**Column B**
1	Angle of Incidence	A	States that the incident ray, reflected ray, and the normal all lie in the same plane.
2	First Law of Reflection	B	The ray of light that strikes the surface of the mirror.
3	Incident Ray	C	The angle between the incoming light ray and the normal.
4	Second Law of Reflection	D	States that the angle of incidence is always equal to the angle of reflection.

Options
(a) 1-A, 2-B, 3-D, 4-C
(b) 1-C, 2-D, 3-B, 4-A
(c) 1-B, 2-A, 3-C, 4-D
(d) 1-D, 2-C, 3-A, 4-B

Ans :

(b) 1-C, 2-D, 3-B, 4-A
The angle of incidence is the angle between the incident ray and the normal. The first law of

reflection states this angle equals the angle of reflection, while the second law states all three components lie in the same plane.

87. Match the real-world application with the type of mirror or lens used.

	Column A		Column B
1	Dental Mirror	A	A convex lens used to view an enlarged image of a nearby object.
2	Vehicle Side-view Mirror	B	A concave mirror used to get an enlarged, erect image of teeth.
3	Magnifying Glass	C	A concave mirror used to direct light into a strong, parallel beam.
4	Torch Reflector	D	A convex mirror used to get a wide, erect, and diminished view of traffic.

Options
(a) 1-C, 2-A, 3-D, 4-B
(b) 1-D, 2-C, 3-B, 4-A
(c) 1-A, 2-B, 3-C, 4-D
(d) 1-B, 2-D, 3-A, 4-C

Ans :

(d) 1-B, 2-D, 3-A, 4-C
A dental mirror is a concave mirror for magnification. A side-view mirror on vehicles is a convex mirror that offers a wide view. A magnifying glass is a convex lens. The reflector in a torch is a concave mirror that helps focus light into a beam.

TRUE AND FALSE

88. A spherical mirror with a reflecting surface that curves inwards is known as a convex mirror.

Ans :

False
A spherical mirror whose reflecting surface curves inwards is called a concave mirror.

89. The image formed by a convex mirror is always erect and smaller than the object.

Ans :

True
A convex mirror always forms an image that is erect and diminished in size, regardless of the object's distance.

90. A concave mirror will always produce an inverted image.

Ans :

False
When an object is placed very close to a concave mirror, it forms an erect and enlarged image. The image only becomes inverted as the object moves farther away.

91. The side-view mirrors used on vehicles are typically concave mirrors.

Ans :

False
Side-view mirrors on vehicles are convex mirrors because their outward curve provides a much wider view of the road behind.

92. According to the first law of reflection, the angle of incidence is equal to the angle of reflection.

Ans :

True
A fundamental law of reflection states that the angle of incidence (i) is always equal to the angle of reflection (r).

93. The laws of reflection apply only to plane mirrors and not to curved or spherical mirrors.

Ans :

False
The laws of reflection are valid for all types of mirrors, including plane, concave and convex mirrors.

94. A concave mirror causes parallel rays of light to spread out, or diverge, upon reflection.

Ans :

False
A concave mirror causes multiple parallel beams of light to get closer, or converge, after reflecting from its surface.

95. A convex lens is a piece of transparent material that is thicker in the middle and thinner at the edges.

Ans :

Downloaded from www.pdf.tube

True
A lens that is thicker at the middle as compared to its edges is defined as a convex lens.

96. An object viewed through a concave lens always appears erect and diminished.

Ans :

True
When an object is seen through a concave lens, it always appears erect and smaller in size (diminished).

97. A convex lens is also known as a diverging lens.

Ans :

False
A convex lens converges light beams and is therefore called a converging lens. A concave lens is a diverging lens.

98. The angle of reflection is measured between the reflected ray and the surface of the mirror.

Ans :

False
The angle of reflection (r) is defined as the angle between the normal (a line perpendicular to the mirror) and the reflected ray.

99. A dentist uses a concave mirror to get an enlarged view of a patient's teeth.

Ans :

True
Dentists use a concave mirror because it provides an enlarged view of the teeth when it is held close to them.

100. A plane mirror always forms an image that is the same size as the object being reflected.

Ans :

True
Unlike spherical mirrors, a plane mirror always forms an erect image that is the same size as the object.

101. A magnifying glass is a common application of a concave lens.

Ans :

False
A magnifying glass is a convex lens, which is used to make small print appear larger.

102. When an object is placed close to a convex lens, it appears erect and enlarged.

Ans :

True
When an object is placed at a small distance from a convex lens, the object appears erect and enlarged in size.

VERY SHORT QUESTIONS

103. What are spherical mirrors?

Ans :

Spherical mirrors are a type of curved mirror whose reflecting surfaces are spherical, shaped as if they are a part of a hollow sphere.

104. How is a concave mirror defined based on its reflecting surface?

Ans :

A concave mirror is a spherical mirror that possesses a reflecting surface that is curved inwards, similar to the inner side of a spoon.

105. What is the primary characteristic of a convex mirror's reflecting surface?

Ans :

A convex mirror is characterized by its reflecting surface that curves or bulges outwards, much like the outer surface of a shiny spoon.

106. What happens to the image in a concave mirror when the object is moved far away?

Ans :

When an object is moved farther away from a concave mirror, the image it forms becomes inverted and its size progressively gets smaller.

107. Describe the image formed by a convex mirror.

Ans :

A convex mirror consistently forms an image that is always erect and diminished, meaning it is smaller than the actual object being reflected.

108. What is an incident ray in the context of reflection?

Ans :

NODIA

In the study of light reflection, the incident ray is defined as the specific ray of light that falls upon the surface of a mirror.

109. Define the reflected ray.

Ans :

The reflected ray is the ray of light that comes back from the mirror's surface after the incident ray has struck the reflecting surface.

110. What is the normal to a reflecting surface?

Ans :

The normal is a line drawn at a 90-degree angle to the reflecting surface at the precise point where the incident ray strikes.

111. How is the angle of incidence (i) determined?

Ans :

The angle of incidence is the angle measured between the normal and the incident ray at the point where the light strikes the mirror.

112. Define the angle of reflection (r).

Ans :

The angle of reflection is the angle found between the normal and the reflected ray, measured from the point of incidence on the mirror.

113. What is the first law of reflection?

Ans :

The first law of reflection states that the angle of incidence is always equal to the angle of reflection ($i = r$) for all surfaces.

114. State the second law of reflection regarding the plane of rays.

Ans :

The second law of reflection specifies that the incident ray, the normal, and the reflected ray all lie in the same geometric plane.

115. How does a concave mirror affect multiple parallel beams of light?

Ans :

When multiple parallel beams of light strike a concave mirror, the reflected beams get closer together; in other words, the mirror converges the light.

Download INDIA's Best Study app NODIA

116. What effect does a convex mirror have on parallel light beams?

Ans :

A convex mirror causes multiple parallel beams of light to spread out after reflection; this effect is known as divergence of the light rays.

117. What is a lens?

Ans :

A lens is a transparent piece of material, typically glass or plastic, which has at least one curved surface to manipulate light passing through it.

118. Describe a convex lens based on its physical shape.

Ans :

A convex lens is a type of lens that is characteristically thicker at its center and thinner at its edges, causing it to bulge outwards.

119. How can you identify a concave lens by its shape?

Ans :

A concave lens can be identified by its physical structure; it is thicker at the edges and comparatively thinner in the middle section.

120. Why is a convex lens also known as a converging lens?

Ans :

A convex lens is called a converging lens because it bends parallel light rays passing through it so that they meet at a single point.

121. Why is a concave lens referred to as a diverging lens?

Ans :

A concave lens is known as a diverging lens because it spreads out parallel light rays that pass through it, making them move apart.

122. What is a common use for convex mirrors on vehicles?

Ans :

Convex mirrors are commonly used as side-view mirrors on vehicles because they provide a wider field of view of the traffic behind the driver.

123. How does an image in a spoon's inner surface differ from its outer surface?

Ans :

Click Here to Buy book on Amazon

The inner curved surface of a spoon acts like a concave mirror, showing an inverted image, while the outer surface acts like a convex mirror, showing an erect image.

124. Why is a dentist's mirror a concave mirror?

Ans :

Dentists use concave mirrors because when held close to a tooth, the mirror provides a magnified and enlarged view, allowing for detailed inspection.

125. How can you distinguish between plane, concave, and convex mirrors by observing an image?

Ans :

A plane mirror gives a same-sized erect image. A concave mirror can give an enlarged or inverted image. A convex mirror always gives a diminished, erect image.

126. Explain why vehicle side mirrors have a warning about objects being closer than they appear.

Ans :

The warning exists because these convex mirrors form smaller images of objects, making them seem farther away than their actual distance from the vehicle.

127. If a light ray hits a mirror along the normal, what is its path after reflection?

Ans :

When a light ray strikes a mirror along the normal, its angle of incidence is zero, so it reflects back along the same path.

128. Are the laws of reflection applicable to curved surfaces like spherical mirrors?

Ans :

Yes, the laws of reflection are valid for all types of mirrors, including spherical mirrors, as each point on the curved surface reflects light individually.

129. How do solar concentrators use mirrors to generate heat?

Ans :

Solar concentrators use concave mirrors to gather and focus sunlight onto a small area, concentrating its energy to produce significant heat for various applications.

Download INDIA's Best Study app NODIA

NODIA

130. What is the role of a convex lens in a magnifying glass?

Ans :

A magnifying glass uses a convex lens to produce an enlarged, erect image of a small object, making details like small print easier to see.

131. Compare the image formed by a concave lens to one formed by a convex mirror.

Ans :

Both a concave lens and a convex mirror produce images that are always erect and diminished in size, regardless of the object's distance.

132. Why do modern telescopes often use a large concave mirror?

Ans :

Reflecting telescopes use a large concave mirror as their main component to gather and focus light from distant celestial objects, forming a clear image.

133. Why are convex mirrors installed at sharp bends on roads?

Ans :

Convex mirrors are placed at sharp road bends to provide drivers with a wider view of the area, revealing oncoming traffic and preventing potential collisions.

134. How does a water drop on an oiled surface act like a lens?

Ans :

A water drop on an oiled surface forms a curved, convex shape that bends light, causing text viewed through it to appear magnified, acting like a simple lens.

135. If you view an object through a convex lens and move the object farther away, what happens?

Ans :

As an object is moved farther from a convex lens, its image transitions from being erect and enlarged to becoming inverted and changing in size.

136. Why does bending the paper in the reflection experiment make the reflected beam disappear?

Ans :

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

Ans :

(A) A convex lens always forms an erect, magnified image.
The image formed by a convex lens depends on the object's distance. While it can form an erect, magnified image when the object is close (acting as a magnifier), it forms an inverted image when the object is far away.

78. A student is given three mirrors without any markings. To identify the concave mirror, the student should look for the mirror that _____.
(A) Always shows an erect and smaller image of any object
(B) Can show both erect/magnified and inverted images
(C) Always shows an erect image of the exact same size
(D) Feels completely flat when you touch its surface

Ans :

(B) Can show both erect/magnified and inverted images
This unique variability is the key identifier for a concave mirror. A convex mirror always shows a smaller, erect image, and a plane mirror always shows a same-sized, erect image. Only the concave mirror's image changes from erect/magnified to inverted as the object moves away.

79. Mirror is to reflection as lens is to _____.
(A) Absorption
(B) Dispersion
(C) Refraction
(D) Scattering

Ans :

(C) Refraction
This analogy links an optical device to the primary physical principle it operates on. Mirrors work by reflecting light from their surface. Lenses work by refracting (bending) light as it passes through their transparent material.

80. To get a clear image of your face while shaving, which type of mirror is most suitable and why?
(A) A convex mirror, because it provides a wide view.
(B) A plane mirror, because it shows the correct size.
(C) Any shiny surface will work equally well.
(D) A concave mirror, because it can provide a magnified, erect image.

Ans :

(D) A concave mirror, because it can provide a magnified, erect image.
For tasks requiring detail like shaving, a magnified view is helpful. A concave mirror, when held closer than its focal length, acts as a magnifier, producing an enlarged and upright image of the face.

81. The image formed by a camera lens on the digital sensor is _____.
(A) Inverted and real
(B) Erect and magnified
(C) Erect and diminished
(D) Virtual and same-sized

Ans :

(A) Inverted and real
A camera uses a convex lens to form a real image on the sensor. A real image is one where light rays actually converge, which is necessary to be captured by a sensor or film. For a single convex lens, this real image is always inverted.

Download INDIA's Best Study app NODIA

82. If you want to spread light out to illuminate a wider area, which optical device would be most effective?
(A) A convex lens or a concave mirror.
(B) A concave lens or a convex mirror.
(C) A plane mirror or a flat piece of glass.
(D) A magnifying glass or a dental mirror.

Ans :

(B) A concave lens or a convex mirror.
To spread light out, you need a diverging device. A concave lens diverges light by refraction, and a convex mirror diverges light by reflection. Both would be effective at spreading a beam of light over a larger area.

MATCHING TYPE QUESTIONS

83. Match the type of mirror or lens with its defining physical characteristic.

	Column A		**Column B**
1	Concave Mirror	A	A mirror with a reflecting surface that bulges outwards.

Downloaded from www.pdf.tube

When an object is viewed through a convex lens at a close distance, it appears erect and enlarged. As the object is moved farther away, the image becomes inverted. This inverted image is initially enlarged but then diminishes in size as the distance from the lens increases. This variability distinguishes it from a concave lens's consistent image.

148. The table summa rises the characteristics of images formed when an object is placed at different distances from two types of spherical mirrors. Based on the data, what is a key difference in the type of image a concave mirror can form compared to a convex mirror?

Mirror Type	Object Position	Image Characteristics
Concave	Close to mirror	Erect and enlarged
Concave	Far from mirror	Inverted and diminished
Convex	Close or far	Always erect and diminished

Ans :

A key difference is that a concave mirror can form both erect and inverted images, depending on the object's distance. In contrast, a convex mirror is only capable of forming an erect image, regardless of the object's position, as shown in the table.

149. Why are concave mirrors used in applications like torch reflectors and by dentists?

Ans :

Concave mirrors are used as reflectors in torches and vehicle headlights because their shape gathers light from a source and directs it into a powerful, parallel beam. Dentists use them because when a concave mirror is held close to the teeth, it produces a magnified, erect image, which is crucial for detailed examination inside the mouth.

150. Explain why a beam of light from a torch with a single slit shifts when the torch is moved.

Ans :

When the torch and slit are moved, the angle at which the incident beam strikes the mirror changes. According to the first law of reflection, the angle of reflection must equal the angle of incidence. Therefore, as the angle of incidence changes, the angle of reflection also changes, causing the reflected beam of light to shift its position.

151. The table shows how three different types of mirrors affect parallel beams of light that strike them. Explain the meaning of 'converge' and 'diverge' based on the actions of the concave and convex mirrors.

Mirror Type	Effect on Parallel Light Beams
Plane	Reflected beams remain parallel.
Concave	Reflected beams come closer together (converge).
Convex	Reflected beams spread out (diverge).

Ans :

To 'converge' means to bring light rays together to a single point, which is what a concave mirror does to parallel beams. To 'diverge' means to spread light rays out from a common point, which is how a convex mirror reflects parallel beams.

152. How do solar furnaces utilize the properties of concave mirrors for industrial purposes?

Ans :

Solar furnaces use large concave mirrors, which are excellent solar concentrators. These mirrors gather vast amounts of sunlight and converge it onto a very small focal area. The immense concentration of solar energy at this point generates extremely high temperatures, which are sufficient for industrial processes like melting steel, providing a sustainable energy source for heavy industry.

153. What makes a convex mirror suitable for use as a surveillance mirror in large stores?

Ans :

A convex mirror is ideal for surveillance in large stores because its outwardly curved surface provides a wide field of vision. This allows it to capture a broad area in a single, diminished, and erect image. Security personnel can monitor large sections of the store from one vantage point, which helps in deterring thefts and observing customer activity.

154. Compare the behavior of light rays when they pass through a convex lens versus a thin, flat glass plate.

NODIA

Ans :

When parallel light rays pass through a thin, flat glass plate, they continue along their original path without converging or diverging. In contrast, when the same parallel rays pass through a convex lens, its curved surfaces bend the light inwards. This causes the rays to converge and meet at a single focal point on the other side.

155. How can you experimentally demonstrate the first law of reflection using a plane mirror and torch?

Ans :

You can verify the first law of reflection through a simple experiment.

- First, direct a single beam of light from a torch onto a plane mirror placed on paper.
- Trace the incident and reflected rays, and the mirror's position.
- Draw the normal at the point of incidence.
- Use a protractor to measure the angle of incidence and the angle of reflection. You will find they are equal.

156. The table compares the images formed by a convex mirror and a concave lens. Based on the data, state one key similarity and one key difference between the images they produce.

Optical Device	**Image Orientation**	**Image Size**
Convex Mirror	Always erect	Always diminished
Concave Lens	Always erect	Always diminished

Ans :

A key similarity is that both the convex mirror and the concave lens always produce an image that is erect and diminished in size. A key difference is that the mirror forms the image by reflection, while the lens forms the image by allowing light to pass through it (refraction).

157. What are the defining characteristics of concave and convex lenses?

Ans :

The defining characteristics of these lenses relate to their shape and effect on light.

- A convex lens is thicker at the center than at the edges and is known as a converging lens.
- A concave lens is thinner at the center than at the edges and is known as a diverging lens.
- These physical differences determine how they bend light passing through them.

158. What are the primary differences between a spherical mirror and a lens?

Ans :

The primary differences between these optical components are:

- A spherical mirror has a reflective surface and forms an image by reflecting light.
- A lens is a transparent material that forms an image by refracting or bending light that passes through it.
- Consequently, we look "in" a mirror to see an image, but we look "through" a lens.

159. How can you identify a mirror as plane, concave, or convex without touching it?

Ans :

You can identify the mirror type by observing your image as you move.

- In a plane mirror, your image is always erect and the same size.
- In a concave mirror, your image is erect and magnified when close, but becomes inverted when far.
- In a convex mirror, your image is always erect and smaller than you are.

160. Why does a convex lens have the ability to burn paper when focusing sunlight?

Ans :

The ability of a convex lens to burn paper comes from its converging property.

- A convex lens takes parallel rays of sunlight that fall upon its surface.
- It bends and concentrates these rays onto a single, sharp, bright spot.
- This concentration of light energy produces enough focused heat at that point to ignite a flammable material like paper.

161. What is the phenomenon of lateral inversion and which mirrors exhibit it?

Ans :

Lateral inversion is the apparent left-right reversal of an image in a mirror.

- It is the reason why your right hand appears as the left hand in your reflection.
- You may remember this from activities with a plane mirror in previous grades.

Click Here to Buy book on Amazon

- The lateral inversion is observed in all three types of mirrors : plane, concave, and convex.

162. Explain how a shiny spoon can demonstrate the properties of both concave and convex mirrors.

Ans :

A shiny metallic spoon serves as an excellent everyday example of spherical mirrors.

- The inner side, which is curved inwards, acts as a concave mirror, typically showing an inverted image of your face.
- The outer side, which bulges outwards, acts as a convex mirror, showing an erect but smaller version of your face.
- This demonstrates how curvature direction affects image formation.

163. The table lists common applications of spherical mirrors. Match each application with the correct type of mirror and justify your choice based on the image properties required.

Application	**Mirror Type**
Car Headlight Reflector	Concave
Vehicle Side-view Mirror	Convex
Dentist's Mirror	Concave

Ans :

Car headlights and dentist's mirrors use concave mirrors to either create a strong, parallel beam of light or a magnified image for examination. Vehicle side-view mirrors are convex because they provide a wider field of view and always show an erect, though diminished, image.

164. Describe the experimental setup to observe the convergence of light by a concave mirror.

Ans :

The setup to show convergence by a concave mirror involves the following components:

- A comb with multiple openings to create parallel beams of light from a torch.
- A concave mirror placed upright on a white paper sheet to receive the light.
- When the parallel beams strike the mirror, the reflected beams are observed to come closer together, or converge, on the paper.

165. What kind of image is formed by a concave lens, and how does it change with distance?

Ans :

A concave lens consistently produces a specific type of image.

- An object viewed through a concave lens always appears erect and diminished in size.
- As the distance between the object and the lens increases, the size of this erect and diminished image also changes, generally becoming even smaller.
- Unlike a convex lens, it never forms an inverted image.

166. List some common devices that use lenses to function.

Ans :

Lenses are integral to many devices we use daily, including:

- Eyeglasses, which correct vision problems.
- Cameras, both standalone and in smart phones, which focus light to capture images.
- Telescopes, used to observe distant celestial objects.
- Microscopes, which magnify tiny objects for detailed study.
- The human eye itself contains a natural convex lens.

167. How does a convex mirror provide a wider field of view than a plane mirror?

Ans :

A convex mirror curves outwards, which allows it to gather light rays from a much broader area compared to a flat plane mirror of the same size. By reflecting light from a wider angle, it compresses a large scene into a smaller, diminished image, effectively providing a more extensive field of view to the observer.

168. Describe what you would observe if you place a small object behind a convex lens and slowly move it away.

Ans :

Initially, when the object is placed very close behind the convex lens, you will see an erect and enlarged image through the lens. As you slowly move the object farther away from the lens, you will reach a point where the image flips and becomes inverted. This inverted image will initially be large but will then decrease in size.

169. Explain the setup for the experiment that demonstrates the second law of reflection.

Downloaded from www.pdf.tube

mirrors provide a wide field of vision, showing more of the road and surrounding traffic, which enhances safety. The trade-off is that objects appear smaller and farther away.

- **Convex - Road Safety Mirror** : Large convex mirrors are placed at blind corners and sharp bends. Their ability to provide a wide-angle view allows drivers to see oncoming traffic that would otherwise be hidden, thus preventing accidents.

182. Detail the steps of an activity to observe image formation in a concave mirror as you change the object's distance.

Ans :

This activity reveals the versatile imaging properties of a concave mirror.

- **Setup** : Place a concave mirror in an upright position on a table using a wooden block. Place a small object, like a toy, in front of it.
- **Close Distance** : Start with the object placed very close to the mirror (3-4 cm). Observe that the image is erect and larger than the object.
- **Move Away** : Slowly move the object away from the mirror. You will notice the image becomes inverted.
- **Far Distance** : As you continue to move the object farther, the inverted image, which may have been initially large, will become smaller in size. Record these changes at each step.

183. How do lenses function in everyday optical instruments like eyeglasses and cameras? Explain the role of convergence and divergence.

Ans :

Lenses are crucial in optical instruments for focusing light.

- **Eyeglasses** : They use either convex or concave lenses to correct vision. A convex lens converges light to help with farsightedness, while a concave lens diverges light to correct nearsightedness, ensuring light focuses correctly on the retina.
- **Cameras** : A camera uses a convex lens (or a system of lenses) to converge light from a scene onto a digital sensor or film. By adjusting the lens, the camera can focus on objects at different distances to form a sharp, clear image.

Download INDIA's Best Study app NODIA

- In both cases, the principle of bending light (convergence or divergence) is used to manipulate the image for a desired outcome.

184. Describe how you can identify an unknown mirror as plane, concave, or convex by analyzing the image of a simple object.

Ans :

You can identify an unknown mirror by observing the image it forms.

- **Plane Mirror** : If you place an object in front of the mirror and the image is always erect and appears to be the same size as the object, regardless of distance, it is a plane mirror.
- **Concave Mirror** : If the image is erect and magnified when the object is close, but flips to become inverted when the object is moved farther away, it is a concave mirror.
- **Convex Mirror** : If the image is always erect and always smaller than the object, no matter how near or far the object is, it is a convex mirror.

NODIA

185. Explain why a concave mirror converges parallel light rays while a convex mirror diverges them, relating it to the laws of reflection.

Ans :

The effect of spherical mirrors on parallel rays stems from their curved shape.

- **Concave Mirror** : Its surface curves inward. When parallel rays hit different points on this surface, the normal at each point has a different orientation. To satisfy the law of reflection ($i = r$), each ray is reflected inwards towards a common point, causing convergence.
- **Convex Mirror** : Its surface bulges outward. The normal at each point on this surface points outwards. Consequently, when parallel rays strike the mirror, they are reflected outwards and away from each other, causing divergence.
- In both cases, each individual ray strictly obeys the laws of reflection, but the overall curvature dictates the collective behavior of the beams.

186. Compare and contrast the effect of a convex lens and a concave mirror on parallel rays of sunlight.

Ans :

Both a convex lens and a concave mirror can concentrate sunlight, but they do so differently.

LONG ANSWER QUESTIONS

177. Explain in detail the two laws of reflection and describe an experiment to verify them.

Ans :

The laws of reflection govern how light bounces off surfaces.

- The first law states that the angle of incidence is equal to the angle of reflection ($i = r$). This means the angle at which light hits a surface is the same as the angle at which it leaves.
- The second law states that the incident ray, the reflected ray, and the normal to the surface at the point of incidence all lie in the same plane.
- To verify these, you can shine a light beam onto a mirror on a sheet of paper. By drawing the rays and the normal, you can measure with a protractor that the angles are equal. Then, by bending the paper out of the plane, you can show the reflected ray disappears, proving it must lie in the same plane.

178. Compare and contrast the images formed by concave and convex mirrors, considering object distance, image orientation, and size.

Ans :

Concave and convex mirrors form images with distinct characteristics.

- **Concave Mirror** : When the object is close, the image is erect and magnified. As the object moves farther away, the image becomes inverted, and its size changes from enlarged to diminished.
- **Convex Mirror** : The image is always erect and diminished in size, regardless of the object's position. The image size does decrease slightly as the object moves away, but it never becomes inverted or magnified.
- **Comparison** : The main contrast is versatility; concave mirrors produce varied images (erect/inverted, magnified/diminished), while convex mirrors produce consistently erect and diminished images. Both show lateral inversion.

179. Describe a detailed experiment to show how different types of mirrors (plane, concave, convex) affect multiple parallel beams of light.

Ans :

This experiment demonstrates the reflective properties of different mirrors.

- **Setup** : Use a torch and a comb with multiple slits to create several parallel beams of light. A sheet of white paper acts as a screen.
- **Plane Mirror** : When the parallel beams fall on a plane mirror, they are reflected as parallel beams, maintaining their original separation.
- **Concave Mirror** : When the beams strike a concave mirror, the reflected rays are bent inwards and come together, or converge, at a single point.
- **Convex Mirror** : When the beams hit a convex mirror, the reflected rays spread outwards, or diverge, as if coming from a point behind the mirror.

180. Explain the key differences between how a convex lens and a concave lens form images, including orientation and size changes.

Ans :

Convex and concave lenses manipulate light to form very different images.

- **Convex Lens** : This is a converging lens. When an object is close, it forms an erect, magnified image (like a magnifying glass). When the object is far, it forms an inverted image that can be either enlarged or diminished.
- **Concave Lens** : This is a diverging lens. It always forms an image that is erect and diminished in size, regardless of the object's distance.
- **Key Difference** : The primary distinction is the convex lens's ability to produce both erect/magnified and inverted images, while the concave lens only ever produces erect, diminished images.

181. Provide and explain three distinct real-world applications of spherical mirrors, specifying whether they are concave or convex and why.

Ans :

Spherical mirrors have many practical uses based on their properties.

- **Concave - Dentist's Mirror** : Dentists use concave mirrors because when held close, they produce a magnified, erect image of the teeth. This enlargement is essential for detailed examination and identifying problems.
- **Convex - Vehicle Side-View Mirror** : Cars use convex mirrors for their side views. These

Click Here to Buy book on Amazon

3. TYPES OF CALENDARS

3.1 Lunar Calendars

These calendars are based on the Moon's phases, with a year consisting of 12 lunar months (about 354 days). Because a lunar year is shorter than a solar year, these calendars do not stay synchronized with the seasons.

3.2 Solar Calendars

1. These calendars are designed to match the solar year (365.25 days) and stay aligned with the seasons.
2. The Gregorian calendar, which is widely used today, is a solar calendar.
3. To account for the extra quarter day each year, a leap year with an extra day (February 29th) is added every four years.

3.3 Luni-solar Calendars

1. These calendars, used in many parts of India, are a hybrid system.
2. They follow the lunar months but add an extra month (called Adhika Maasa) every two to three years to ensure the calendar stays in sync with the solar year and the seasons.

3.4 The Indian National Calendar

India's official calendar is a solar calendar that starts on March 22nd, the day after the spring equinox. It consists of 365 days and uses traditional Indian month names.

4. CALENDARS AND FESTIVALS

Many Indian festivals are tied to lunar or luni-solar calendars, so their dates change each year on the Gregorian calendar. For example, Diwali falls on the new Moon of Kartika, and Holi falls on the full Moon of Phalguna.

5. ARTIFICIAL SATELLITES

5.1 Definition and Purpose

While the Moon is Earth's natural satellite, artificial satellites are human-made objects launched into orbit. They are used for many important purposes, including communication, navigation, weather monitoring, disaster management, and scientific research.

5.2 India's Space Program (ISRO)

The Indian Space Research Organization (ISRO) has launched many satellites to support these activities. Key missions include the Chandrayaan missions to the Moon, Mangalyaanto Mars, and Aditya-L1to study the Sun.

NODIA

NCERT EXERCISE

1. State whether the following statements are True or False.

(i) We can only see that part of the Moon which reflects sunlight towards us.

(ii) The shadow of Earth blocks sunlight from reaching the Moon causing phases.

(iii) Calendars are based on various astronomical cycles which repeat in a predictable manner.

(iv) The Moon can only be seen at night.

Ans :

(i) True. We can only see the illuminated portion of the Moon that faces the Earth. The Moon shines by reflecting sunlight that falls on it.

(ii) False. The phases of the Moon are caused by the change in the portion of the Moon's illuminated surface that we can see from Earth as it revolves around us. The Earth's shadow falling on the Moon causes a lunar eclipse, not the regular phases.

(iii) True. Calendars are based on natural, predictable cycles like the Earth's rotation (day), the Moon's revolution (month), and the Earth's revolution around the Sun (year).

(iv) False. The Moon is sometimes visible during the day. A waning moon, for instance, is easiest to spot at sunrise.

2. Amol was born on 6th of May on a full Moon day. Does his birthday fall on the full Moon day every year? Explain your answer.

Ans :

No, Amol's birthday will not fall on a full Moon day every year. This is because the calendar year (a solar year) is about 365 days long, while the time it takes for the Moon to go through all its

- **Concave Mirror** : It is a reflecting surface. It gathers parallel sunrays and reflects them inwards to converge at a single bright spot in front of the mirror. This focused heat can burn paper.
- **Convex Lens** : It is a transparent material. It takes parallel sunrays and refracts (bends) them as they pass through, causing them to converge at a single bright spot on the other side of the lens. This also produces enough heat to burn paper.
- The key similarity is their converging effect, while the difference lies in the mechanism : reflection for the mirror and refraction for the lens.

CASE BASED QUESTIONS

187. A student looks at her reflection in a shiny metallic spoon. When she looks at the inner, inwardly curved surface, her image appears inverted. When she flips the spoon and looks at the outer, outwardly bulging surface, her image is erect but smaller in size. This simple object acts as both a concave and a convex spherical mirror.

Questions:

1. Which type of spherical mirror has a reflecting surface that curves inwards?
2. The outer, bulging surface of the spoon acts like which type of mirror?
3. What is the key difference between the image formed by the inner surface and the outer surface of the spoon in this example?

Ans :

1. A concave mirror has a reflecting surface that curves inwards.
2. It acts like a convex mirror.
3. The key difference is that the image formed by the inner (concave) surface was inverted, while the image formed by the outer (convex) surface was erect.

188. A dentist uses a small, round mirror on a stick to inspect a patient's teeth. When the mirror is held close to a tooth, it provides an enlarged and erect view, allowing the dentist to see details clearly. This dental mirror is a concave mirror, which can magnify objects when they are placed very close to its reflecting surface.

Questions:

1. What type of mirror is used by dentists for inspecting teeth?
2. What are the characteristics of the image this mirror produces when held close to the teeth?
3. If the dentist moved the mirror far away from the tooth, what would happen to the orientation of the image?

Ans :

1. A dentist uses a concave mirror.
2. It provides an enlarged and erect view of the teeth.
3. When an object is moved farther away from a concave mirror, the image becomes inverted.

189. A driver uses the side-view mirror to see the traffic behind her. The mirror is a convex mirror, so the image of the cars behind is always erect but diminished (smaller than the actual vehicles). This type of mirror is used because its outwardly curved surface provides a much wider view of the road behind compared to a flat, plane mirror.

Questions:

1. What type of mirror is used as a side-view mirror on vehicles?
2. What are the two main characteristics of the image formed by this type of mirror?
3. Why is a convex mirror more suitable for this purpose than a plane mirror?

Ans :

1. A convex mirror is used as a side-view mirror.
2. The image is always erect and diminished in size.
3. A convex mirror is more suitable because its curved surface provides a much wider area of the road behind, which is safer for the driver.

190. On a sunny day, a student holds a concave mirror facing the sun and directs the reflected light onto a piece of paper. She adjusts the distance until a sharp, bright spot forms. After a few minutes, the paper starts to burn. This happens because the concave mirror converges the parallel sunrays to a single point, concentrating the heat energy.

Questions:

1. Does a concave mirror converge or diverge parallel beams of light?
2. Why does the paper start to burn at the location of the bright spot?
3. If the student had used a convex mirror for the same activity, would the paper have burned? Explain why or why not.

Downloaded from www.pdf.tube

Ans :

1. A concave mirror converges parallel beams of light.
2. The paper burns because the light from the sun gets concentrated on that point, producing sufficient heat to ignite it.
3. No, the paper would not have burned. A convex mirror diverges (spreads out) parallel beams of light, so it would not concentrate the sun's energy onto a single point.

Download INDIA's Best Study app NODIA

191. A student uses a magnifying glass to read the small print in a book. The letters appear much larger and are erect when viewed through the lens. The magnifying glass is a convex lens. When an object is placed close to a convex lens, it forms an enlarged and erect image, which is how it helps in reading small text.

Questions:

1. What type of lens is a magnifying glass?
2. What are the two characteristics of the image of the letters seen through the magnifying glass?
3. If the student slowly moved the magnifying glass far away from the book, how would the appearance of the text change?

Ans :

1. A magnifying glass is a convex lens.
2. The image of the letters appears enlarged and erect.
3. As the distance between the object and the convex lens increases, the image appears inverted.

192. A student shines a thin beam of light (the incident ray) onto a plane mirror. The light bounces off as the reflected ray. By drawing a line normal (perpendicular) to the mirror at the point of incidence, she measures the angle of incidence and the angle of reflection. She finds that both angles are always equal to each other.

Questions:

1. What is the angle between the normal and the incident ray called?
2. According to the first law of reflection, what is the relationship between the angle of incidence (i) and the angle of reflection (r)?
3. If the light ray falls on the mirror along the normal, what would be the angle of incidence?

Ans :

1. It is called the angle of incidence (i).
2. The angle of incidence is equal to the angle of reflection ($i = r$).
3. The angle of incidence would be zero.

NODIA

193. A student looks at a small toy through a concave lens. No matter how close or far she moves the toy from the lens, its image always appears erect and diminished (smaller than the actual toy). This consistent characteristic is a key difference between a concave lens and a convex lens, which can form different types of images.

Questions:

1. What is a lens that is thicker at the edges and thinner in the middle called?
2. What are the two properties of an image that is always formed by a concave lens?
3. How can you distinguish between a concave lens and a convex lens just by looking at the image of a distant object through them?

Ans :

1. It is called a concave lens.
2. The image is always erect and diminished in size.
3. A concave lens will always show an erect and diminished image. A convex lens will show an inverted and diminished image of a distant object.

194. In an activity, a student shines a light ray onto a mirror placed on a flat sheet of paper. Both the incident and reflected rays are visible on the paper. When she bends the part of the paper where the reflected ray is seen, the reflected ray disappears from view. This demonstrates the second law of reflection.

Questions:

1. What is the ray of light that falls on the mirror called?
2. Why did the reflected ray disappear when the student bent the paper?
3. What three things all lie in the same plane, according to the second law of reflection?

Ans :

1. It is called the incident ray.
2. Bending the sheet created a new plane, so the reflected ray was no longer on the same plane as the incident ray and the normal.
3. The incident ray, the normal to the mirror at the point of incidence, and the reflected ray all lie in the same plane.

195. A student passes multiple parallel beams of light through different transparent materials. When the beams pass through a flat glass plate, they remain parallel. When they pass through a convex lens, the beams are bent inwards and meet at a point (converge). When they pass through a concave lens, the beams spread outwards (diverge).

Questions:

1. Which type of lens is also called a converging lens?
2. What happens to parallel rays of light after they pass through a concave lens?
3. How does the behavior of light passing through a convex lens compare to light reflecting off a concave mirror?

Ans :

1. A convex lens is also called a converging lens.
2. The light rays diverge, or spread out.
3. Both a convex lens and a concave mirror converge parallel beams of light.

196. The inside of a torch head, behind the bulb, has a shiny, curved surface. This surface is a concave mirror. Its purpose is to take the light spreading out from the small bulb and reflect it forward as a strong, parallel beam. This concentrating effect of the concave mirror allows the torch to illuminate objects far away.

Questions:

1. What shape are the reflectors of torches and headlights of cars?
2. What is the function of the concave mirror in a torch?
3. Why would a flat (plane) mirror be ineffective as a reflector in a torch?

Ans :

1. The reflectors are concave in shape.
2. It converges the light from the bulb and reflects it as a parallel beam, making the light more focused and powerful.
3. A plane mirror would simply reflect the light rays as they spread out, without concentrating them into a strong, directed beam.

197. At a sharp, blind turn on a mountain road, a large, curved mirror is installed. This mirror is a convex mirror. It allows drivers approaching the turn to see a wide view of the road around the bend, showing any oncoming traffic. This helps prevent collisions and improves safety at locations where visibility is limited.

Questions:

1. What type of mirror is installed at road intersections for safety?
2. What kind of image does this mirror provide to the drivers?
3. Why is a convex mirror's ability to provide a "wider area" of view crucial for this application?

Ans :

1. A convex mirror is installed for road safety.
2. It provides an erect and diminished image of the traffic.
3. The wider field of view allows a driver to see much more of the road around a blind corner than a flat mirror would, giving them an early warning of any hazards.

198. A student is given a mirror but doesn't know what type it is. She places a pencil in front of it. When the pencil is close, the image is erect and larger than the pencil. When she moves the pencil far away, the image becomes inverted. Based on these observations, she correctly identifies the mirror.

Questions:

1. What are the three types of mirrors the student might have?
2. What observation was the key clue to identifying the mirror?
3. Based on the observations, what type of mirror is it? Explain your reasoning.

Ans :

1. The mirror could be a plane mirror, concave mirror, or convex mirror.
2. The key clue was that the image changed from erect to inverted as the object was moved away.
3. It is a concave mirror. Only a concave mirror can form both an erect, enlarged image (when the object is close) and an inverted image (when the object is farther away).

199. A student places a single drop of water on a plastic scale resting over a book. The oil on the scale helps the water form a round drop with an outwardly curved surface. When he looks at the text through the water drop, the letters appear larger. This simple water drop is acting like a basic convex lens.

Questions:

1. What is a lens?
2. The water drop was thicker in the middle and curved outwards.

Click Here to Buy book on Amazon

Ans :

The experiment requires a stiff sheet of paper placed on a table with part of it extending over the edge. A plane mirror is placed on the paper. A beam of light is shone on the mirror, and the reflected beam is observed on the extended portion. When the extended part of the paper is bent downwards, the reflected beam disappears.

170. Compare the image formed in a concave mirror when an object is very close versus very far.

Ans :

The image characteristics in a concave mirror depend heavily on the object's distance. When an object is very close, the image is erect and appears larger than the object. In contrast, when the object is moved far away from the mirror, the image becomes inverted. This ability to form different types of images makes concave mirrors versatile.

171. How can one differentiate between a convex lens and a concave lens simply by looking through them at an object?

Ans :

One can easily differentiate the lenses by observing an object through them. When an object is viewed through a convex lens from a close distance, it appears enlarged and erect. In contrast, when the same object is viewed through a concave lens from any distance, it always appears diminished and erect. The magnifying effect is unique to the convex lens.

172. What are the different types of spherical mirrors and how are they represented schematically?

Ans :

The two types of spherical mirrors are concave and convex.

- A concave mirror has its reflecting surface curved inwards. Schematically, it is drawn as a curved line with shading on the outer side.
- A convex mirror has its reflecting surface curved outwards. Its schematic representation is a curved line with shading on the inner side.
- The shading indicates the non-reflecting, coated surface.

173. What did the experiment with multiple parallel beams of light reveal about plane, concave, and convex mirrors?

Ans :

The experiment showed how different mirror shapes affect parallel light.

- A plane mirror reflects parallel beams as parallel beams.
- A concave mirror causes the reflected parallel beams to get closer, or converge.
- A convex mirror makes the reflected parallel beams spread apart, or diverge.
- This demonstrates the converging and diverging properties of spherical mirrors.

174. Describe the process of viewing an object through a concave lens.

Ans :

The process involves observing how the lens alters the appearance of an object.

- Place an object behind the concave lens and look through the lens from the other side.
- You will observe that the object always appears erect and diminished in size.
- As you move the object farther away from the lens, the image remains erect and diminished, though its size will change slightly.

175. What happens if you shine a beam of light along the normal to a mirror? Explain using the laws of reflection.

Ans :

If a light beam is incident along the normal, it reflects back along the same path.

- The normal is perpendicular (90°) to the mirror's surface.
- An incident ray along the normal has an angle of incidence of 0°.
- According to the first law of reflection, the angle of reflection must also be 0°.
- A 0° angle of reflection means the reflected ray travels back along the normal.

176. How can you set up an experiment to show that a water drop can act as a lens?

Ans :

This experiment demonstrates the lensing effect of a curved water surface.

- First, coat a flat, clear plastic strip with a thin layer of oil or wax.
- Use a dropper to place a single, round drop of water onto the coated surface.
- Place this setup over a piece of paper with printed text.
- When you look down through the water drop, the letters below will appear enlarged.

NODIA

CHAPTER 11

KEEPING TIME WITH THE SKIES

SUMMARY

1. THE PHASES OF THE MOON

1.1 Why the Moon's Appearance Changes

The Moon does not produce its own light; it shines by reflecting sunlight. At any given time, half of the Moon is illuminated by the Sun.

The phases of the Moon are the changing shapes of the Moon's bright portion that we see from Earth.

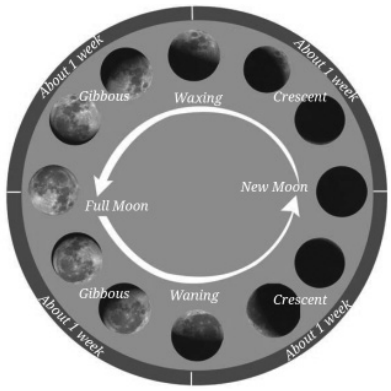
These phases occur because as the Moon revolves around the Earth, we see different amounts of its sunlit half. A common misconception is that the phases are caused by the Earth's shadow, but this is incorrect. The Earth's shadow causes a lunar eclipse, not the regular phases.

Download INDIA's Best Study app NODIA

1.2 The Lunar Cycle : Waxing and Waning

1. The full cycle of the Moon's phases takes about a month (approximately 29.5 days).
2. Full Moon (Purnima) : Occurs when we see the entire illuminated side of the Moon.
3. New Moon (Amavasya) : Occurs when the Moon is between the Earth and the Sun, so we cannot see its illuminated side.
4. Waning Period (Krishna Paksha) : The two-week period after the full Moon when the visible bright portion gets smaller.
5. Waxing Period (Shukla Paksha) : The two-week period after the new Moon when the visible bright portion grows larger.
6. The Moon rises about 50 minutes later each day due to its own motion around the Earth.

NODIA



Waxing (Shukla Paksha) and waning period (Krishna Paksha) of the Moon as viewed from the Earth

2. NATURAL CYCLES FOR TIMEKEEPING

Ancient civilizations used predictable, repeating cycles in the sky to measure time.

2.1 The Day

The basic unit of time, the day, is based on the Earth's rotation on its axis. A mean solar day is the average time it takes for the Sun to return to its highest point in the sky, which is 24 hours.

2.2 The Month

The concept of a month is based on the Moon's revolution around the Earth, which completes a full cycle of phases in about 29.5 days.

2.3 The Year

The concept of a year is based on the Earth's revolution around the Sun, which takes about 365.25 days. This cycle also determines the seasons.

Download INDIA's Best Study app NODIA

Which type of lens does it behave like?
3. What property of light is demonstrated when it passes through the curved water drop, making the letters appear larger?

Ans :

1. A lens is a piece of transparent material, usually made of glass or plastic, which has curved surfaces.
2. It behaves like a convex lens.
3. The light rays are bent as they pass from air, through the water lens, and back to the air, which can magnify the image.

200. A teacher explains that some images can be formed on a screen, while others cannot. When she uses a convex lens to focus the light from a distant window onto a piece of paper, a sharp, inverted image of the window appears on the paper. This is a real image. However, an image seen in a plane mirror cannot be formed on a screen.

Questions:

1. What is the difference between a real image and a virtual image?
2. Was the image of the window formed by the convex lens real or virtual?
3. When you look at your face in a plane mirror, are you seeing a real or a virtual image? Explain.

Ans :

1. A real image can be formed on a screen, while a virtual image cannot.
2. The image of the window was real because it was formed on the paper screen.
3. You are seeing a virtual image. You cannot project your reflection from a plane mirror onto a piece of paper; the image only appears to be behind the mirror.

201. The human eye contains a lens that helps us see the world. This lens is a convex lens. It focuses light from the objects we look at onto the back of the eye. Amazingly, this biological lens can change its shape, which allows us to clearly see objects that are both very close, like a book, and very far away.

Questions:

1. What type of lens is found inside the human eye?
2. What is the function of this lens in the eye?
3. Name two man-made optical instruments that use lenses to help us see things better.

Ans :

1. The human eye has a convex lens.
2. It focuses light from objects to form an image on the back of the eye.
3. Two examples are eyeglasses and microscopes (or telescopes/cameras).

****

Downloaded from www.pdf.tube

phases and return to a full Moon is about 29.5 days. A lunar year of 12 full moon cycles is only about 354 days long. Since the solar calendar year and the lunar year have different lengths, the full Moon will occur on a different date each year.

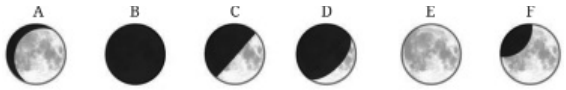
3. Name two things that are incorrect in Figure

Ans :

The two incorrect things in the figure are:

1. Stars are shown behind the dark part of the Moon. The Moon is a solid, spherical body, and it is not transparent. We cannot see stars through it.
2. The crescent is shown illuminated from the top. The Moon is illuminated by the Sun. At night, the Sun is below the horizon, so the crescent should be illuminated from the side or bottom, pointing towards the location of the set Sun.

4. Look at the pictures of the Moon in Figure and answer the following questions.



(i) Write the correct panel number corresponding to the phases of the Moon shown in the pictures above.

(ii) List the picture labels of the phases of the Moon that are never seen from Earth.

Ans :

(i)

Phase of Moon	Picture Label
Three days after New Moon	F
Full Moon	C
Three days after Full Moon	B
A week after Full Moon	A
Day of New Moon	E

(ii) Picture D shows a phase of the Moon that is never seen from Earth. Crescents seen from Earth are always illuminated from the side (left or right), not from the top or bottom as depicted.

5. Malini saw the Moon overhead in the sky at sunset.

(i) Draw the phase of the Moon that Malini saw.

(ii) Is the Moon in the waxing or the waning phase?

Ans :

(i) Malini saw a First Quarter Moon. It looks like a half-circle with the right side illuminated.

(ii) The Moon is in the waxing phase. A waxing moon's illuminated portion is increasing and is easiest to spot at sunset.

6. Ravi said, "I saw a crescent Moon, and it was rising in the East, when the Sun was setting." Kaushalya said, "Once I saw the gibbous Moon during the afternoon in the East." Who out of the two is telling the truth?

Ans :

Kaushalya is telling the truth. A waxing gibbous Moon rises in the eastern sky during the afternoon. Ravi's statement is incorrect because a crescent Moon seen near sunset would be a waxing crescent, which follows the Sun and would be setting in the West, not rising in the East.

7. Scientific studies show that the Moon is getting farther away from the Earth and slower in its revolution. Will luni-solar calendars need an intercalary month more often or less often?

Ans :

Luni-solar calendars will need an intercalary month less often. An intercalary (extra) month is added every few years to make up for the difference between the shorter lunar year (\~354 days) and the longer solar year (\~365 days). If the Moon's revolution slows down, the lunar month will become longer. This will make the lunar year closer in length to the solar year, reducing the difference between them. As the difference accumulates more slowly, the extra month will not be needed as frequently.

8. A total of 37 full Moons happen during 3 years in a solar calendar. Show that at least two of the 37 full moons must happen during the same month of the solar calendar.

Ans :

NODIA

The Earth's shadow falling on the Moon is the cause of a lunar eclipse, which is a rare event. The regular, nightly changing phases are caused by our changing viewing angle of the Moon's sunlit hemisphere as it orbits Earth.

Download INDIA's Best Study app NODIA

22. A solar year, which is based on the cycle of seasons, is approximately how many days long?
(A) 354 days
(B) 365 and a quarter days
(C) 360 days
(D) 29.5 days

Ans :

(B) 365 and a quarter days
A solar year is defined by the time it takes for the Earth to complete one full revolution around the Sun. This period is approximately 365.24 days, leading to the cycle of seasons and the basis for solar calendars.

23. Why do solar calendars like the Gregorian calendar incorporate a 'leap year'?
(A) To keep all the months perfectly aligned with the Moon's phases.
(B) To make the calendar year significantly shorter than a solar year.
(C) To account for the extra quarter of a day in the Earth's solar orbit.
(D) To ensure that all of the months have the exact same number of days.

Ans :

(C) To account for the extra quarter of a day in the Earth's solar orbit.
The Earth's orbit is about 365.25 days. To prevent the calendar from drifting out of sync with the seasons, an extra day is added every four years (0.25 x 4 = 1) to make up for the accumulated quarter days.

24. A calendar that primarily uses the Moon's phases for months but adds an extra month every few years to align with the seasons is called a _____.
(A) Solar calendar
(B) Luni-solar calendar
(C) Lunar calendar
(D) Seasonal calendar

Ans :

(B) Luni-solar calendar
A luni-solar calendar is a hybrid system. It tracks months based on the lunar cycle but intercalates an extra month periodically to ensure that the calendar year remains aligned with the solar year and its associated seasons.

25. Solar year is to the Earth's revolution around the Sun as a day is to the _____.
(A) Moon's revolution around the Earth
(B) cycle of seasons
(C) Moon's phases
(D) Earth's rotation on its axis

Ans :

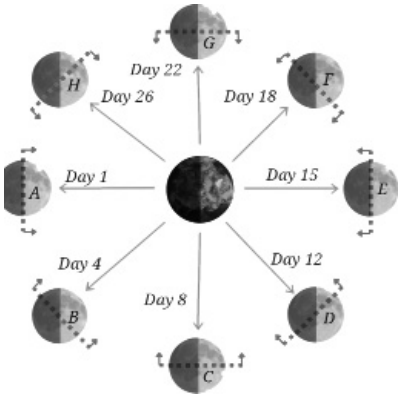
(D) Earth's rotation on its axis
This analogy relates a unit of time to its astronomical cause. The year is defined by the Earth's orbit around the Sun. The day is the fundamental unit of time defined by one complete rotation of the Earth on its own axis.

26. The time that the Sun takes to go from its highest position in the sky on one day to the highest position on the next is called the _____.
(A) Lunar day
(B) Mean solar day
(C) Sidereal day
(D) Equinox

Ans :

(B) Mean solar day
A mean solar day is the average time between two successive instances of the Sun reaching its highest point in the sky (local noon). This period averages out to be 24 hours and is the basis for our standard day.

27. In the diagram of the Moon's phases (Figure), at position A, the entire illuminated portion of the Moon faces Earth. What phase is this?



Click Here to Buy book on Amazon

(B) 24 hours
(C) About a month (29.5 days)
(D) About a year (365 days)

Ans :

(C) About a month (29.5 days)
The time it takes for the Moon to orbit the Earth relative to the Sun and return to the same phase (e.g., full Moon) is approximately 29.5 days. This period, known as a synodic month, is the basis for the month in many calendars.

16. The day when the Moon appears as a full, bright circle in the sky is called _____.
(A) Amavasya
(B) Purnima
(C) Crescent
(D) Gibbous

Ans :

(B) Purnima
Purnima is the Sanskrit term for the full Moon day. On this day, the Earth is positioned between the Sun and the Moon, allowing us to see the entire sunlit face of the Moon.

17. If you see a half Moon in the sky, what phase will you most likely see approximately one week later?
(A) A full Moon or a new Moon.
(B) Another half Moon.
(C) A crescent Moon.
(D) A gibbous Moon.

Ans :

(A) A full Moon or a new Moon.
The lunar cycle progresses in approximately one-week intervals between its four major phases. One week after the first quarter (half Moon), it will be a full Moon. One week after the third quarter (half Moon), it will be a new Moon.

18. Why are lunar and solar eclipses rare events and do not occur every month?
(A) Because the Earth's shadow is not large enough to cover the Moon.
(B) Because the Sun, Earth, and Moon are rarely in the same solar system.
(C) Because the Moon stops revolving for a few days during each month.
(D) Because the Moon's orbit is slightly tilted relative to the Earth's orbit.

Ans :

(D) Because the Moon's orbit is slightly tilted relative to the Earth's orbit.
For an eclipse to occur, the Sun, Earth, and Moon must be perfectly aligned. Due to the tilt in the Moon's orbit, it usually passes above or below the Earth's shadow (for a lunar eclipse) or its shadow misses the Earth (for a solar eclipse).

NODIA

19. In Indian tradition, what is the waning period of the Moon (from full Moon to new Moon) called?
(A) Shukla Paksha
(B) Amant
(C) Krishna Paksha
(D) Purnimant

Ans :

(C) Krishna Paksha
Krishna Paksha, or the "dark fortnight," is the period in the Hindu calendar when the illuminated portion of the Moon decreases. This phase begins the day after the full Moon and ends on the new Moon day.

20. If you observe the Moon at the same time each day (e.g., at sunrise), you will notice that its position in the sky has shifted. Why does this happen?
(A) The Moon moves ahead in its orbit while the Earth rotates.
(B) The Earth's rotation speed changes every day.
(C) The Sun's position shifts, making the Moon appear to move.
(D) The stars behind the Moon are moving.

Ans :

(A) The Moon moves ahead in its orbit while the Earth rotates.
In the 24 hours it takes for the Earth to rotate once, the Moon has also moved a certain distance along its own orbit. The Earth must then rotate a little extra (about 50 minutes) to "catch up" and bring the Moon to the same apparent position in the sky.

21. Which of the following is a common misconception about the phases of the Moon?
(A) The Moon revolves around the Earth.
(B) The Moon reflects sunlight.
(C) The full cycle of phases takes about a month.
(D) The phases are caused by the Earth's shadow falling on the Moon.

Ans :

(D) The phases are caused by the Earth's shadow falling on the Moon.

Three solar years have a total of 36 months (3 years × 12 months/year). If there are 37 full Moons over these 36 months, there are more full Moons than months. Even if one full Moon occurred in each of the 36 months, there would still be one full Moon left over. This 37th full Moon must therefore occur in a month that already has a full Moon, meaning at least one month must have two full Moons.

9. On a particular night, Vaishali saw the Moon in the sky from sunset to sunrise. What phase of the Moon would she have noticed?

Ans :

She would have noticed the Full Moon phase. The full Moon is visible for the entire night because it is nearly opposite the Sun; it rises around sunset and sets around sunrise.

Download INDIA's Best Study app NODIA

10. If we stopped having leap years, in approximately how many years would the Indian Independence day happen in winter?

Ans :

In approximately 730 years. Without leap years, the calendar would be exactly 365 days long. However, the actual time it takes for the Earth to orbit the Sun (a tropical year) is about 365.25 days. This means the calendar would fall behind the seasons by about 0.25 days every year. For Independence Day (in August, summer) to shift to winter, the seasons would need to drift by about half a year, or 182.5 days. It would take approximately 730 years for this shift to occur (182.5 days ÷ 0.25 days/year = 730 years).

11. What is the purpose of launching artificial satellites?

Ans :

Artificial satellites are launched for many purposes, including communication, navigation, weather monitoring, disaster management, and scientific research. For example, ISRO's Cartosat satellites are used to improve maps and plan cities, while AstroSat makes scientific observations of stars.

12. On which periodic phenomenon are the following measures of time based : (i) day (ii) month (iii) year?

Ans :

(i) Day : A day is based on the period of the Earth's rotation on its axis, measured by the time it takes for the Sun to return to its highest position in the sky.
(ii) Month : A month is based on the period of the Moon's revolution around the Earth, which causes the cycle of the Moon's phases.
(iii) Year : A year is based on the period of the Earth's revolution around the Sun, which causes the cycle of seasons.

MULTIPLE CHOICE QUESTION

13. What is the primary reason the Moon has different phases as seen from Earth?
(A) We see different amounts of the Moon's sunlit half as it orbits Earth.
(B) The Earth's shadow frequently falls on the surface of the Moon.
(C) The Moon's actual physical shape changes during the month.
(D) Clouds in the Earth's atmosphere often cover parts of the Moon.

Ans :

(A) We see different amounts of the Moon's sunlit half as it orbits Earth.
The Moon reflects sunlight, so half of it is always illuminated. As the Moon orbits Earth, our viewing angle of this sunlit portion changes, causing us to see varying shapes, from a thin crescent to a full circle.

14. The period when the bright, visible portion of the Moon is increasing in size is known as the ——————.
(A) Waning period (B) New Moon period
(C) Eclipse period (D) Waxing period

Ans :

(D) Waxing period
"Waxing" means to grow or increase. This term describes the phase of the lunar cycle from the new Moon to the full Moon, during which the illuminated portion of the Moon that is visible from Earth becomes progressively larger.

15. Approximately how long does it take for the Moon to complete one full cycle of its phases, from one full Moon to the next?
(A) One week

Downloaded from www.pdf.tube

(A) Full Moon
(B) New Moon
(C) Crescent Phase
(D) Gibbous Phase

Ans :

(A) Full Moon
The diagram shows that at position A, the Earth is between the Sun and the Moon. From our perspective on Earth, we can see the entire half of the Moon that is lit by the Sun, which is the full Moon phase.

28. A festival like Diwali is celebrated on the new Moon day of Kartika. An observer notes its date on the Gregorian calendar is different each year. This is because Diwali is based on a _____.
(A) Luni-solar or lunar calendar that is based on the moon.
(B) Purely solar calendar that ignores the moon's phases.
(C) Fixed seasonal calendar that does not change from year to year.
(D) Modern satellite-based calendar used for scientific purposes.

Ans :

(A) Luni-solar or lunar calendar that is based on the moon.
Festivals tied to lunar phases, like Diwali (new Moon) or Holi (full Moon), follow a calendar based on the Moon's cycle. Since a lunar year is shorter than a solar (Gregorian) year, the dates of these festivals shift annually on the Gregorian calendar.

29. What is the name of the Indian Space Research Organization's (ISRO) mission to Mars?
(A) Chandrayaan
(B) AstroSat
(C) Mangalyaan
(D) Bhuvan

Ans :

(C) Mangalyaan
Mangalyaan, also known as the Mars Orbiter Mission (MOM), was India's first interplanetary mission. Launched by ISRO, it successfully entered Mars' orbit to study its atmosphere and surface features.

30. Which of the following statements about artificial satellites is incorrect?
(A) They are man-made objects orbiting Earth.
(B) They are used for communication and weather monitoring.
(C) They can become space debris after their useful life.
(D) They are considered Earth's only natural satellites.

Ans :

(D) They are considered Earth's only natural satellites.
The Moon is Earth's only natural satellite. Artificial satellites are machines designed and launched by humans into orbit for specific purposes. This distinction between natural and artificial is fundamental.

31. Why can the Moon sometimes be seen during the daytime?
(A) Because it is actually a type of very bright and distant star.
(B) Its orbit can place it in the sky at the same time as the Sun.
(C) It is simply an optical illusion caused by the Earth's atmosphere.
(D) Because it is physically closer to the Earth during the daytime.

Ans :

(B) Its orbit can place it in the sky at the same time as the Sun.
The Moon is always in the sky for about 12 hours out of every 24. Whether this is during the day or night depends on its phase. If it is above the horizon while the sun is up, its reflected sunlight is often bright enough for it to be seen.

32. What is 'Adhika Maasa'?
(A) An extra month added to a luni-solar calendar to align it with seasons.
(B) An extra day that is added during a standard leap year.
(C) The official name of the first month in the Indian National Calendar.
(D) A large festival that celebrates the appearance of the full Moon.

Ans :

(A) An extra month added to a luni-solar calendar to align it with seasons.
Adhika Maasa, or an intercalary month, is the mechanism used in Indian luni-solar calendars to resolve the discrepancy between the 354-day lunar year and the 365-day solar year. This extra month is added every two to three years.

NODIA

Bhuvan is a geospatial platform, similar to Google Earth, developed by the Indian Space Research Organisation (ISRO). It utilizes images from Indian remote sensing satellites to provide detailed mapping services.

57. A student in India celebrates the festival of Holi on a full Moon day in March. A student in another country celebrates a festival that always falls on December 25th. The first student's festival is based on a _____, while the second's is based on a _____.
(A) Solar calendar, lunar calendar
(B) Satellite calendar, star calendar
(C) Luni-solar calendar, solar calendar
(D) Seasonal calendar, lunar calendar

Ans :

(C) Luni-solar calendar, solar calendar
Holi is tied to a specific lunar phase (full Moon), so it follows a lunar or luni-solar calendar, causing its date to shift on the Gregorian calendar. Christmas (December 25th) is a fixed date on the Gregorian calendar, which is a solar calendar.

58. The Earth's rotation on its axis is the primary cause for the natural cycle of _____.
(A) The seasons
(B) The Moon's phases
(C) A year
(D) Day and night

Ans :

(D) Day and night
The cycle of day and night is a direct result of the Earth spinning on its axis. As it rotates, different parts of the planet are turned towards the Sun (experiencing day) and away from the Sun (experiencing night).

59. A sidereal year is slightly longer than a tropical year. The tropical year is based on the cycle of _____, while the sidereal year is based on the position of _____.
(A) The Moon, the Sun
(B) The seasons (equinoxes), the distant stars
(C) The stars, the seasons
(D) The Sun, the Moon

Ans :

(B) The seasons (equinoxes), the distant stars
The tropical year is the time it takes the Sun to return to the same position relative to the seasons (e.g., from one spring equinox to the next). The sidereal year is the time it takes the Earth to complete one orbit relative to the fixed background stars.

60. What is the main benefit of using a luni-solar calendar over a purely lunar one for an agricultural society?
(A) It keeps the months and festivals aligned with the four seasons.
(B) It is much simpler to calculate than a purely solar calendar.
(C) Its years are consistently shorter, which makes it more accurate.
(D) It does not require any observation of the sun, moon, or stars.

Ans :

(A) It keeps the months and festivals aligned with the four seasons.
For agriculture, knowing the timing of seasons is crucial. A purely lunar calendar would drift, making festivals meant for spring occur in winter over time. The luni-solar calendar's added month corrects this drift, keeping it synchronized with the agricultural seasons.

61. On which two days of the year does the Sun rise exactly in the East and set exactly in the West?
(A) The solstices
(B) The first day of every month
(C) Only on a leap day
(D) The equinoxes

Ans :

(D) The equinoxes
The equinoxes (around March 21 and September 23) are the two points in Earth's orbit where the axis is not tilted toward or away from the Sun. On these days, the Sun's path is directly over the equator, causing it to rise due east and set due west everywhere on Earth.

62. The phase of the Moon when less than half of its visible side is illuminated is called the _____.
(A) Full Moon
(B) New Moon
(C) Crescent phase
(D) Gibbous phase

Ans :

(C) Crescent phase
The crescent phase occurs just after the new Moon (waxing crescent) and just before the new Moon (waning crescent). During this time, we see only a sliver, or less than half, of the Moon's sunlit hemisphere.

Click Here to Buy book on Amazon

39. An ancient farmer wants to create a calendar to predict the arrival of the planting season (spring) accurately every year. Which type of calendar would be most suitable for this purpose?
(A) A purely lunar calendar.
(B) A calendar based only on the positions of the stars.
(C) A solar or luni-solar calendar.
(D) A calendar with 30 days in every month.

Ans :

(C) A solar or luni-solar calendar.
The seasons are determined by the Earth's revolution around the Sun (a solar year). A purely lunar calendar would drift relative to the seasons. Therefore, a solar calendar (like the Gregorian) or a luni-solar calendar (which adjusts to the solar year) is necessary for accurate seasonal prediction.

40. Which of the following is an INCORRECT statement about how ancient people kept time?
(A) They measured the year accurately using precise atomic clocks.
(B) They used the Moon's phases to define the length of a month.
(C) They used the Earth's daily rotation to define the length of a day.
(D) They used the Sun's changing position to define a year.

Ans :

(A) They measured the year accurately using precise atomic clocks.
Ancient civilizations made remarkably accurate measurements of the year using naked-eye astronomy (observing the sun and stars), but they lacked modern instruments like atomic clocks for such high precision.

41. The apparent northward movement of the Sun from December to June is known as _____.
(A) Uttarayan
(B) Dakshinayan
(C) Equinox
(D) Solstice

Ans :

(A) Uttarayan
Uttarayan refers to the period when the Sun appears to move from the Tropic of Capricorn towards the Tropic of Cancer. This corresponds to the Sun's northward journey in the sky, as observed from the Northern Hemisphere.

42. A 'sidereal year' is a unit of time based on what astronomical observation?
(A) The time between successive full Moons.
(B) The time between successive spring equinoxes.
(C) The time it takes for the Sun to rotate once.
(D) The time required for the same stars to rise again at sunset.

Ans :

(D) The time required for the same stars to rise again at sunset.
A sidereal year is measured relative to the fixed stars. It is the time it takes for the Earth to complete one full orbit around the Sun and return to the same position with respect to the distant stars.

43. Why does a purely lunar calendar, like the Islamic calendar, have its festivals occur in different seasons over the years?
(A) Because the Moon's orbit around the Earth is speeding up.
(B) Because it doesn't add a month to align with the solar year.
(C) Because its months are based on the Sun's apparent position.
(D) Because it has a leap year every two years to make corrections.

Ans :

(B) Because it doesn't add a month to align with the solar year.
A year of 12 lunar months is about 11 days shorter than a solar year. Without any correction, this difference accumulates, causing the months and their associated festivals to drift backward through the seasons over a cycle of about 33 years.

44. To find the shortest shadow cast by a vertical stick during the day, you would measure the shadow's length around _____.
(A) Local noon
(B) Sunrise
(C) Sunset
(D) Midnight

Ans :

(A) Local noon
An object's shadow is shortest when the Sun is at its highest point in the sky. This event, known as local noon or solar noon, is the basis for defining the solar day.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

33. When is the best time to spot a waning Moon?
(A) At midnight directly overhead.
(B) At sunrise in the sky.
(C) At sunset in the western sky.
(D) It is never visible.

Ans :

(B) At sunrise in the sky.
A waning Moon (from full to new) follows the Sun across the sky. This means it rises later in the night and is often visible in the morning sky after the sun has risen, particularly in its gibbous and quarter phases.

34. On a full Moon day, the Moon is nearly _____ the Sun in the sky, while on a new Moon day, it appears _____ the Sun.
(A) Closer to the Sun in the sky; opposite the Sun
(B) Next to the Sun in the sky; directly below the Sun
(C) Above the Sun in the sky; right next to the Sun
(D) Opposite the Sun in the sky; closer to the Sun

Ans :

(D) Opposite the Sun in the sky; closer to the Sun
On a full Moon day, the Earth is between the Sun and Moon, so they appear on opposite sides of the sky (one rises as the other sets). On a new Moon day, the Moon is between the Sun and Earth, so they appear very close together in the sky.

35. How does the Indian National Calendar differ from the widely used Gregorian calendar?
(A) The Indian National Calendar is a purely lunar-based calendar.
(B) It is a solar calendar that begins around the spring equinox.
(C) The Indian National Calendar begins its year on January 1st.
(D) The Indian National Calendar does not have any leap years.

Ans :

(B) It is a solar calendar that begins around the spring equinox.
While both are solar calendars, their starting points and month structures differ. The Gregorian calendar starts on January 1st. The Indian National Calendar starts on a date linked to an astronomical event, the spring equinox.

36. The ISRO satellite series 'Cartosat' is primarily used for what purpose?
(A) To capture high-quality images of Earth for mapping.
(B) To study distant stars and other celestial objects.
(C) To act as a communication relay for television signals.
(D) To study the Sun's atmosphere and solar flares.

Ans :

(A) To capture high-quality images of Earth for mapping.
The Cartosat series of satellites are Earth observation satellites. They are equipped with high-resolution cameras designed to take detailed pictures of the Earth's surface, which are used for cartography, urban planning, and managing natural disasters.

37. Day is to 24 hours as lunar month is to _____.
(A) 29.5 days (B) 365 days
(C) 7 days (D) 12 hours

Ans :

(A) 29.5 days
This analogy relates a time period to its approximate duration. A solar day is approximately 24 hours long. A lunar month, the time for the Moon to complete its cycle of phases, is approximately 29.5 days long.

38. If you are on the Moon, you would observe the Earth going through phases. This happens for the same reason the Moon has phases, which is _____.
(A) The Moon's large shadow falling on the surface of the Earth.
(B) The Earth physically changing its shape throughout the month.
(C) The clouds on Earth covering different parts of its surface.
(D) The changing amount of Earth's sunlit side visible from the Moon.

Ans :

(D) The changing amount of Earth's sunlit side visible from the Moon.
The principle is identical but reversed. From the Moon, an observer would see the Earth, which reflects sunlight. As the Moon orbits the Earth, the observer's viewing angle of Earth's illuminated hemisphere would change, creating 'Earth-phases'.

NODIA

to account for the Earth's ~365.25-day orbit, ensuring it does not drift out of sync with the seasons.

51. If you spot a satellite in the early evening sky, it appears as a steadily moving point of light. What is the source of this light?
(A) The satellite's own powerful lights.
(B) The satellite is reflecting sunlight.
(C) The satellite is burning up in the atmosphere.
(D) It is a distant star moving very quickly.

Ans :

(B) The satellite is reflecting sunlight.
Artificial satellites are visible for the same reason the Moon is : they do not produce their own light but are high enough in orbit to catch and reflect the Sun's light down to an observer on the dark side of Earth, especially just after sunset or before sunrise.

52. The day when the Moon is not visible from Earth because its non-illuminated side is facing us is known as the _____.
(A) New Moon day
(B) Full Moon day
(C) Waning gibbous
(D) Solar eclipse

Ans :

(A) New Moon day
On the new Moon day (Amavasya), the Moon is positioned between the Earth and the Sun. From our viewpoint, the side of the Moon facing us is not lit by the Sun, making it invisible in the sky.

53. A solar eclipse can only happen on a _____ day, and a lunar eclipse can only happen on a _____ day.
(A) Full Moon day, new Moon day
(B) First quarter, third quarter
(C) New Moon day, full Moon day
(D) Third quarter, first quarter

Ans :

(C) New Moon day, full Moon day
For a solar eclipse, the Moon must be between the Sun and Earth to cast its shadow, which is the new Moon phase. For a lunar eclipse, the Earth must be between the Sun and Moon to cast its shadow, which is the full Moon phase.

Download INDIA's Best Study app NODIA

54. Why do some calendars, which are based on the Moon's phases, drift with respect to the seasons?
(A) Because the phases of the Moon are not regular or predictable.
(B) Because the rotation of the Earth on its axis is gradually slowing down.
(C) Because a 12-month lunar year is about 11 days shorter than a solar year.
(D) Because solar calendars do not account for the four distinct seasons.

Ans :

(C) Because a 12-month lunar year is about 11 days shorter than a solar year.
A lunar month is about 29.5 days, so 12 lunar months total about 354 days. This is significantly shorter than the ~365-day solar year that governs the seasons, causing a purely lunar calendar to fall behind the seasons each year.

55. Which of the following is an INCORRECT reason for why observing celestial cycles was important to ancient civilizations?
(A) To predict the arrival of seasons for the purpose of agriculture.
(B) To navigate across the oceans using artificial satellites.
(C) To create various calendars for the purpose of tracking time.
(D) To schedule religious festivals and other cultural events.

Ans :

(B) To navigate across the oceans using artificial satellites.
Ancient civilizations were expert naked-eye astronomers, but artificial satellites are a product of modern 20th-century technology. They used stars for navigation, but not man-made satellites.

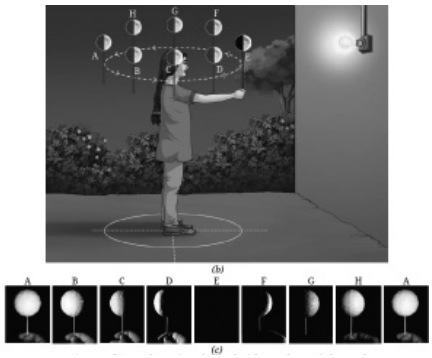
56. What is Bhuvan, developed by ISRO?
(A) A mapping platform using satellite images of the Earth.
(B) A powerful space telescope for observing distant galaxies.
(C) A type of rocket used by ISRO to launch heavy satellites.
(D) The official name given to India's very first astronaut.

Ans :

(A) A mapping platform using satellite images of the Earth.

Click Here to Buy book on Amazon

45. The activity in Figure uses a ball, a student, and a lamp. What do these three components represent, respectively?



(b) A student using a ball and stick to understand phases of Moon; (c) The ball as seen by the student at different positions

(A) Sun, Moon, Earth
(B) Earth, Sun, Moon
(C) Sun, Earth, Moon
(D) Moon, Earth, Sun

Ans :

(D) Moon, Earth, Sun
The activity is a model to understand phases. The ball represents the Moon, which reflects light. The student's head represents the Earth, from where the observation is made. The lamp represents the Sun, the source of light.

46. What is a key difference between a solar eclipse and a lunar eclipse?
(A) A solar eclipse happens at night; a lunar eclipse happens during the day.
(B) Solar eclipses happen every month, but lunar eclipses are quite rare.
(C) A solar eclipse is the Moon's shadow on Earth; a lunar is Earth's on the Moon.
(D) Solar eclipses are visible from the entire day side of the planet Earth.

Ans :

(C) A solar eclipse is the Moon's shadow on Earth; a lunar is Earth's on the Moon.
In a solar eclipse, the Moon passes between the Sun and Earth, casting a shadow on Earth. In a lunar eclipse, the Earth passes between the Sun and Moon, casting its shadow on the Moon.

47. Gibbous is to 'more than half' as _____ is to 'less than half'.
(A) Full (B) New
(C) Quarter (D) Crescent

Ans :

(D) Crescent
This analogy defines lunar phases based on the amount of illumination. The gibbous phase occurs when more than half of the Moon's visible side is lit. The crescent phase occurs when less than half is lit.

48. Which statement about the Moon is INCORRECT?
(A) It is Earth's only natural satellite.
(B) It emits its own light.
(C) It takes about a month to revolve around the Earth.
(D) One half of the Moon always faces the Earth.

Ans :

(B) It emits its own light.
The Moon does not generate its own light like the Sun. We see the Moon because its surface reflects the light that it receives from the Sun.

49. The time between successive spring equinoxes is called the _____.
(A) Tropical year
(B) Sidereal year
(C) Lunar year
(D) Leap year

Ans :

(A) Tropical year
The tropical year is based on the cycle of the seasons. It is defined as the time it takes for the Sun to return to the same position in the sky relative to the Earth's equinoxes, which is about 365.24 days.

50. The Indian National Calendar adds a leap day to its first month, Chaitra. What is the purpose of this?
(A) To keep its months aligned with the various phases of the Moon.
(B) To ensure that Chaitra is always the longest month of the year.
(C) To celebrate the start of the year with an additional festival day.
(D) To match the leap years of the Gregorian calendar for synchronization.

Ans :

(D) To match the leap years of the Gregorian calendar for synchronization.
Since the Indian National Calendar is a solar calendar designed for official use alongside the Gregorian calendar, it incorporates a leap day

NODIA

63. If Earth had no Moon, which of the following natural cycles would be absent?
(A) The cycle of day and night.
(B) The monthly cycle of lunar phases.
(C) The cycle of seasons.
(D) The cycle of sunrise and sunset.

Ans :

(B) The monthly cycle of lunar phases.
The phases of the Moon are a direct result of the Moon orbiting the Earth. Without a moon, there would be no lunar orbit and therefore no cycle of lunar phases to observe. Day/night and seasons are related to Earth's own motion.

64. Which statement about calendars is INCORRECT?
(A) Luni-solar calendars need no corrections for seasons.
(B) The Gregorian calendar is a type of solar calendar.
(C) Lunar calendars are based on the Moon's phases.
(D) The day is the basic unit for all known calendars.

Ans :

(A) Luni-solar calendars need no corrections for seasons.
Luni-solar calendars specifically require a correction mechanism. They need to add an extra month (Adhika Maasa) every 2-3 years precisely to correct for the 11-day difference between the lunar and solar years and thus stay in sync with the seasons.

65. AstroSat is to studying stars as Cartosat is to _____.
(A) Studying the Moon
(B) Studying the Sun
(C) Launching student satellites
(D) Mapping the Earth

Ans :

(D) Mapping the Earth
This analogy relates an ISRO mission to its primary function. AstroSat is India's multi-wavelength space observatory designed to study celestial objects. The Cartosat series of satellites are designed for Earth observation and high-resolution mapping.

66. A person wants to observe as much of the Moon's surface detail as possible using a telescope. On which night would they see the most illuminated surface area?
(A) New Moon
(B) First Quarter
(C) Full Moon
(D) Crescent Moon

Ans :

(C) Full Moon
On the night of the full Moon, the entire face of the Moon visible from Earth is illuminated by the Sun. This provides the maximum possible bright surface area for observing features like craters and seas.

67. What is 'space debris'?
(A) Natural asteroids, comets, and other space rocks.
(B) Defunct artificial satellites and their rocket parts.
(C) A type of invisible gas that is found in outer space.
(D) The fine layer of dust on the surface of the Moon.

Ans :

(B) Defunct artificial satellites and their rocket parts.
Space debris, or space junk, refers to man-made objects left in orbit that no longer serve a useful purpose. This includes old satellites, spent rocket stages, and fragments from collisions, posing a hazard to active spacecraft.

68. Why does the Moon rise approximately 50 minutes later each day?
(A) The Earth's rotation slows down by approximately 50 minutes each day.
(B) The Moon's orbit around the Earth is gradually getting larger.
(C) The Sun's powerful gravity constantly pulls the Moon back.
(D) The Earth has to rotate extra to catch up to the moving Moon.

Ans :

(D) The Earth has to rotate extra to catch up to the moving Moon.
As the Earth completes one 24-hour rotation, the Moon has also traveled forward in its orbit. For an observer on Earth to see the Moon in the same position in the sky, the Earth must rotate for an additional period, which averages about 50 minutes.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

69. If you observe a crescent Moon in the western sky just after sunset, what can you infer about the Moon's phase?
(A) It is a waning crescent.
(B) It is a full Moon.
(C) It is a waxing crescent.
(D) It is the third quarter Moon.

Ans :

(C) It is a waxing crescent.
A waxing crescent Moon occurs a few days after the new Moon. At this phase, it is relatively close to the Sun in the sky and follows the Sun across the sky, making it visible in the west shortly after sunset.

70. A _____ calendar is based on the Earth's revolution around the Sun, while a _____ calendar is based on the Moon's revolution around the Earth.
(A) Solar, lunar
(B) Lunar, solar
(C) Luni-solar, solar
(D) Lunar, luni-solar

Ans :

(A) Solar, lunar
The definitions of these calendar types are based on their primary astronomical cycle. Solar calendars track the ~365-day solar year (Earth's orbit). Lunar calendars track the ~29.5-day lunar month (Moon's orbit).

Download INDIA's Best Study app NODIA

71. What is a major difference between the Moon and an artificial satellite?
(A) The Moon orbits the Sun, while artificial satellites orbit the Earth.
(B) The Moon is a natural satellite, while the other is man-made.
(C) The Moon reflects light, while artificial satellites produce their own.
(D) The Moon's orbit is unpredictable, while artificial satellites have fixed orbits.

Ans :

(B) The Moon is a natural satellite, while the other is man-made.
This is the fundamental distinction between them. The Moon formed naturally and is a celestial body. Artificial satellites are machines designed, built, and launched by humans to perform specific tasks.

72. The phase of the Moon when more than half, but not all, of its visible side is illuminated is called _____.
(A) Gibbous
(B) Crescent
(C) Half-moon
(D) New moon

Ans :

(A) Gibbous
The term 'gibbous' is used to describe the lunar phase when the Moon is more than half illuminated. This occurs during the waxing period between the first quarter and full Moon, and during the waning period between the full Moon and the third quarter.

73. The Indian National Calendar was adopted for official use on which date of the Gregorian calendar?
(A) January 1, 1950
(B) August 15, 1947
(C) October 2, 1869
(D) March 22, 1957

Ans :

(D) March 22, 1957
The Calendar Reform Committee's recommendation was adopted, and the new Indian National Calendar came into official use from 1 Chaitra 1878 Saka Era, which corresponds to March 22, 1957.

NODIA

74. The shortest shadow from a vertical stick occurs when the Sun is at its highest point. This event marks _____.
(A) Sunrise
(B) Sunset
(C) The middle of the solar day
(D) The start of a lunar month

Ans :

(C) The middle of the solar day
The Sun's highest point in the sky is known as local noon or solar noon. This is the moment that divides the daylight hours in half and serves as the reference point for measuring a 24-hour solar day.

75. Which of the following is NOT a purpose of artificial satellites launched by ISRO?
(A) Communication and navigation.
(B) Changing the phases of the Moon.
(C) Capturing images of Earth for mapping.
(D) Making scientific observations of stars.

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

Ans :

(B) Changing the phases of the Moon.
The phases of the Moon are a natural phenomenon caused by its orbit around the Earth. Artificial satellites are tools for observation, communication, and research; they cannot influence the movements or appearances of celestial bodies.

76. Makar Sankranti is a festival based on a solar calendar. What does this imply about its date on the Gregorian calendar?
(A) It occurs on almost the same date every year (e.g., Jan 14th or 15th).
(B) It occurs on a different date each year, shifting by about 11 days.
(C) It occurs on the same date every year.
(D) It only occurs during a leap year.

Ans :

(A) It occurs on almost the same date every year (e.g., Jan 14th or 15th).
Since both Makar Sankranti's calendar (a sidereal solar calendar) and the Gregorian calendar (a tropical solar calendar) are based on the ~365-day year, their dates stay closely aligned, resulting in the festival falling on a nearly fixed date.

77. Earth is to natural satellite as _____ is to artificial satellite.
(A) Sun
(B) Moon
(C) Mars
(D) AstroSat

Ans :

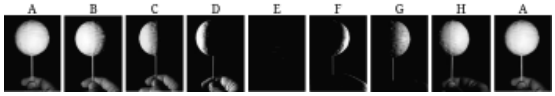
(D) AstroSat
This analogy distinguishes between natural and man-made satellites of Earth. The Moon is the natural satellite. AstroSat is an example of an artificial, man-made satellite launched by India.

78. Why does a year in a purely lunar calendar have about 354 days?
(A) Because a lunar month is exactly 30 days long.
(B) Because it is adjusted to match the seasons.
(C) Because it consists of 12 lunar months, each approximately 29.5 days long.
(D) Because the Moon slows down its orbit once a year.

Ans :

(C) Because it consists of 12 lunar months, each approximately 29.5 days long.
A lunar calendar is based on the Moon's cycle. Multiplying the length of one lunar month (approx. 29.5 days) by 12 gives a total of approximately 354 days, which is about 11 days shorter than a solar year.

79. In the model from figure , when the student sees the ball as fully dark (position E), this represents the _____.



(A) Full Moon
(B) New Moon
(C) Lunar Eclipse
(D) Solar Eclipse

Ans :

(B) New Moon
At position E, the ball (Moon) is between the observer (Earth) and the lamp (Sun). The side of the ball facing the observer is not illuminated by the lamp, so it appears dark. This corresponds to the New Moon phase.

80. What is a tropical year?
(A) The time between successive spring equinoxes.
(B) The time it takes for the Moon to orbit the Earth.
(C) A year with 13 months.
(D) The time it takes for the same stars to rise at sunset.

Ans :

(A) The time between successive spring equinoxes.
A tropical year, which is the basis for the Gregorian calendar, is defined by the cycle of the seasons. It measures the time from one vernal (spring) equinox to the next.

Download INDIA's Best Study app NODIA

81. A student observes a gibbous moon high in the sky in the early morning, before the sun rises. What can be inferred about the moon's phase?
(A) It is a waxing gibbous.
(B) It is a full moon.
(C) It is a new moon.
(D) It is a waning gibbous.

Ans :

(D) It is a waning gibbous.

Click Here to Buy book on Amazon

139. What is the waning period of the Moon, and what is its Indian name?

Ans :

The two-week period when the bright portion of the Moon decreases is called the waning period. In India, it is generally called the Krishna Paksha.

140. Compare the length of a lunar year to a solar year.

Ans :

A lunar year, consisting of 12 lunar months, is about 354 days long, which is approximately 11 days shorter than the 365-day solar year.

141. What is ISRO's mapping platform Bhuvan used for?

Ans :

Bhuvan is a mapping platform that uses images from Cartosat satellites to display India's terrain, soil, land use, vegetation, and other geographical features.

142. Why do we only see one side of the Moon from Earth?

Ans :

We only see one side of the Moon because as it revolves around the Earth, only one half of its surface consistently faces our planet.

SHORT ANSWER QUESTIONS

143. Explain the fundamental difference between a lunar calendar and a solar calendar.

Ans :

A lunar calendar is based on the Moon's phases, with a year of about 354 days, causing it to drift out of sync with the seasons. A solar calendar, like the Gregorian, is based on the Earth's 365-day revolution around the Sun, keeping it aligned with the seasons by using mechanisms like leap years.

144. What is the primary reason for the Moon's changing phases?

Ans :

The main reasons for the Moon's phases are:

- The Moon shines by reflecting sunlight, so one half is always illuminated.
- The Moon revolves around the Earth.
- As the Moon orbits, our viewing angle from Earth changes.
- This change in perspective means we see different amounts of the Moon's illuminated half, creating the phases.

145. The table below shows the Moon's phase as seen from Earth based on its position in orbit relative to the Sun. Using this information, explain why we see a 'Full Moon' at Position A and a 'New Moon' at Position E.

Position in Orbit	Sun-Earth-Moon Alignment	Phase Seen from Earth
A	Sun–Earth–Moon (Earth in the middle)	Full Moon
C	Sun–Moon–Earth at 90° (Half Moon)	First Quarter
E	Sun–Moon–Earth (Moon in the middle)	New Moon
G	Sun–Earth–Moon at 90° (Half Moon)	Third Quarter

Ans :

At Position A, the Earth is between the Sun and Moon, so the entire side of the Moon facing us is illuminated by the Sun, appearing as a Full Moon. At Position E, the Moon is between the Sun and Earth, so the illuminated side faces away from us, making it invisible (New Moon).

146. Describe the structure and purpose of the Indian National Calendar.

Ans :

The Indian National Calendar is a solar calendar with 365 days, officially adopted by the Government of India. It begins on March 22, the day after the spring equinox. Its months, named from traditional calendars, have either 30 or 31 days. To stay synchronized with the Gregorian calendar, it adds a leap day to its first month, Chaitra, during leap years.

147. Explain why the statement "The Moon's phases are caused by Earth's shadow" is incorrect.

NODIA

2	Lunar Eclipse	B	Caused by the Earth's shadow falling on the Moon, which can only happen on a full Moon day.
3	Artificial Satellite	C	The average 24-hour period based on the time it takes for the Sun to return to its highest point in the sky.
4	Mean Solar Day	D	Caused by the changing angles at which we view the Moon's illuminated half.

Options

(a) 1-A, 2-C, 3-B, 4-D
(b) 1-D, 2-B, 3-A, 4-C
(c) 1-C, 2-D, 3-A, 4-B
(d) 1-B, 2-A, 3-D, 4-C

Ans :

(b) 1-D, 2-B, 3-A, 4-C
The phases of the Moon are due to our changing view of its sunlit side. A lunar eclipse occurs when the Earth's shadow covers the Moon. An artificial satellite is a man-made object sent into orbit. A mean solar day is based on Earth's rotation relative to the Sun.

86. Match the term from Indian calendars with its correct meaning.

	Column A		**Column B**
1	Krishna Paksha	A	The period when the Moon's visible illuminated part is increasing.
2	Shukla Paksha	B	The day of the full Moon.
3	Adhika Maasa	C	The period when the Moon's visible illuminated part is decreasing.
4	Purnima	D	An extra, intercalary month added to luni-solar calendars to keep them synchronized with the seasons.

Options

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-D, 2-B, 3-A, 4-C
(c) 1-B, 2-C, 3-D, 4-A
(d) 1-A, 2-D, 3-B, 4-C

Ans :

(a) 1-C, 2-A, 3-D, 4-B
In India, the waning period is called Krishna Paksha, and the waxing period is called Shukla Paksha. Adhika Maasa is the extra month added to luni-solar calendars. Purnima is the name for the full Moon day.

87. Match the type of calendar with its defining characteristic.

	Column A		**Column B**
1	Solar Calendar	A	Primarily follows the Moon's phases but adds an extra month every few years to align with the seasons.
2	Lunar Calendar	B	A widely used solar calendar that has months of varying lengths and uses leap years.
3	Luni-solar Calendar	C	Based on the Earth's revolution around the Sun, resulting in a year of about 365 days.
4	Gregorian Calendar	D	Based only on the Moon's cycle of phases, resulting in a year of about 354 days.

Options

(a) 1-B, 2-A, 3-D, 4-C (b) 1-C, 2-D, 3-A, 4-B
(c) 1-D, 2-C, 3-B, 4-A (d) 1-A, 2-B, 3-C, 4-D

Ans :

(b) 1-C, 2-D, 3-A, 4-B
A solar calendar is based on the 365-day solar year. A lunar calendar is based on the 354-day lunar year. A luni-solar calendar combines both systems by adding an extra month periodically. The Gregorian calendar is the most common example of a solar calendar.

NODIA

Ans :

A mean solar day is the average time the Sun takes to go from its highest position one day to the next, which is 24 hours.

114. Why do festivals like Diwali and Holi fall on different Gregorian calendar dates each year?

Ans :

These festivals are tied to lunar or luni-solar calendars, which are based on the Moon's phases, causing their dates to shift on the solar Gregorian calendar.

115. What natural cycle provides the basis for defining a month in a calendar?

Ans :

The cycle of the phases of the Moon, which takes about 29.5 days to complete, provides the basis for a month as a unit of time.

116. On a full Moon day, where would you expect to see the Moon in the sky at sunrise?

Ans :

On a full Moon day, the Moon is nearly opposite the Sun, so at sunrise in the East, the Moon would be seen setting in the West.

117. What is the basis for a solar year as a unit of time?

Ans :

A solar year is based on the Earth completing one cycle of seasons as it revolves around the Sun, which takes approximately 365 and a quarter days.

118. Explain the purpose of adding a leap day to solar calendars like the Gregorian calendar.

Ans :

A leap day is added every four years to account for the extra quarter of a day in Earth's revolution, keeping the calendar synchronized with the seasons.

119. How many lunar months were fitted into one cycle of seasons in ancient lunar calendars?

Ans :

Ancient people noticed that nearly 12 cycles of the Moon's phases, or 12 lunar months, could be fitted into one cycle of seasons.

120. Why is a waxing Moon easiest to spot at sunset and a waning Moon at sunrise?

Ans :

The Moon's position relative to the Sun changes with its phase, making the waxing Moon more visible after sunset and the waning Moon before sunrise.

121. What is the primary difference between a tropical year and a sidereal year?

Ans :

A tropical year is the time between successive spring equinoxes, while a sidereal year is when the same stars rise again at sunset; the sidereal year is slightly longer.

122. Why was it important for ancient agricultural societies to create solar calendars?

Ans :

Solar calendars were crucial for agricultural purposes because they needed a year that was synchronized with the predictable arrival of seasons for planting and harvesting.

123. What is the primary purpose of launching artificial satellites into Earth's orbit?

Ans :

Artificial satellites are launched for many purposes, including communication, navigation, weather monitoring, disaster management, and scientific research that support our well-being.

124. How does the Indian National Calendar handle leap years to stay aligned with the Gregorian calendar?

Ans :

Leap years in the Indian National Calendar are matched to the Gregorian calendar by adding an extra day to Chaitra, the first month of the year.

125. What is the role of ISRO's Cartosat series of satellites?

Ans :

The Cartosat satellites, launched by ISRO, capture high-quality images of Earth to improve maps, plan cities, and help manage natural disasters in India.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

Ans :

True
Many Indian festivals are tied to the lunar cycle; for example, Diwali falls on the new Moon and Holi on the full Moon.

101. The Sun's apparent daily movement across the sky is caused by the Earth's revolution around the Sun.

Ans :

False
The apparent periodic motion of the Sun is primarily due to the rotation of the Earth on its own axis.

102. A waning Moon is easiest to spot during sunset.

Ans :

False
A waning Moon is easiest to spot at sunrise, while a waxing Moon is easiest to see at sunset

VERY SHORT QUESTIONS

103. What are the changing shapes of the bright portion of the Moon as seen from Earth called?

Ans :

The changing shapes of the bright part of the Moon that are visible from Earth from one day to another are called the phases of the Moon.

104. Why does the Moon appear to rise about 50 minutes later each day?

Ans :

The Moon rises about 50 minutes later each day because it moves ahead in its orbit while the Earth completes one rotation on its axis.

105. What is the full Moon day, and what is its alternative name in India?

Ans :

The day when the Moon appears as a full bright circle is called the full Moon day, which is also known in India as Purnima.

106. How could you distinguish a plane mirror from a spherical mirror just by observing an image?

Ans :

A plane mirror always forms an erect image of the same size, while spherical mirrors can form images that are enlarged, diminished, or even inverted.

107. What is the period called when the bright part of the Moon increases, and what is its Indian name?

Ans :

The period when the bright portion of the Moon increases is called the waxing period. In India, this period is generally known as Shukla Paksha.

108. Explain why lunar and solar eclipses do not occur every month on new and full Moon days.

Ans :

Eclipses do not happen every month because of the small tilt of the Moon's orbit with respect to the Earth's orbit around the Sun.

NODIA

109. What is the new Moon day, and what is its alternative name in India?

Ans :

The day when the Moon is not visible at all from the Earth is called the new Moon day, which is also known as Amavasya.

Download INDIA's Best Study app NODIA

110. If a festival follows a purely lunar calendar, why does it occur in different seasons over the years?

Ans :

A lunar calendar does not account for the difference between a 354-day lunar year and a 365-day solar year, causing festivals to shift seasons.

111. What is the natural cycle that forms the foundation of the day as a unit of time?

Ans :

The natural cycle of the Sun appearing to rise and set, caused by the Earth's rotation on its axis, is the foundation of the day.

112. How does a luni-solar calendar stay synchronized with the cycle of seasons over time?

Ans :

Luni-solar calendars add an extra month, called Adhika Maasa, every few years to align the shorter lunar year with the longer solar seasonal cycle.

113. What is a mean solar day and how long is it?

A waning moon (moving from full to new) rises progressively later after sunset. A waning gibbous moon rises after sunset and is still high in the sky and visible in the hours before and during sunrise.

82. The Indian scientist who was the chairperson of the Calendar Reform Committee and developed a famous equation in astrophysics is _____.
(A) C. V. Raman
(B) Vikram Sarabhai
(C) Meghnad Saha
(D) Homi J. Bhabha

Ans :

(C) Meghnad Saha
Meghnad Saha was a pioneering Indian astrophysicist known for the Saha ionization equation. He also applied his scientific expertise to a practical national problem by chairing the Calendar Reform Committee to create a unified national calendar for India.

MATCHING TYPE QUESTIONS

83. Match the phase of the Moon with its correct description.

	Column A		Column B
1	Full Moon (Purnima)	A	The period when the visible bright portion of the Moon is decreasing each day.
2	New Moon (Amavasya)	B	The day when the Moon is not visible from Earth because its non-illuminated side faces us.
3	Waning Period	C	The period when the visible bright portion of the Moon is increasing each day.
4	Waxing Period	D	The day when the entire illuminated side of the Moon is visible from Earth.

Options
(a) 1-A, 2-C, 3-D, 4-B
(b) 1-B, 2-D, 3-C, 4-A
(c) 1-C, 2-A, 3-B, 4-D
(d) 1-D, 2-B, 3-A, 4-C

Ans :

(d) 1-D, 2-B, 3-A, 4-C
A Full Moon is when the Moon appears as a full bright circle. A New Moon is when it is not visible. The waning period is when the bright part shrinks, while the waxing period is when it grows.

84. Match the unit of time with the astronomical cycle it is based on.

	Column A		Column B
1	Day	A	Based on the cycle of the Moon's phases as it revolves around the Earth.
2	Month	B	An adjustment made every four years in a solar calendar to keep it synchronized with the seasons.
3	Year	C	Based on the Earth's revolution around the Sun, which causes the cycle of seasons.
4	Leap Year	D	Based on the Earth's rotation on its axis, which causes the apparent daily motion of the Sun.

Options
(a) 1-D, 2-A, 3-C, 4-B
(b) 1-C, 2-B, 3-A, 4-D
(c) 1-B, 2-C, 3-D, 4-A
(d) 1-A, 2-D, 3-B, 4-C

Ans :

(a) 1-D, 2-A, 3-C, 4-B
The day is based on Earth's rotation. The month is based on the Moon's phases. The year is based on Earth's revolution around the Sun. A leap year is a calendar correction to account for the extra quarter day in a solar year.

85. Match the astronomical phenomenon with its scientific cause.

	Column A		Column B
1	Phases of the Moon	A	A man-made object orbiting Earth, used for communication and research.

Click Here to Buy book on Amazon

126. Explain the concept of Uttarayan and Dakshinayan as observed by ancient sky-watchers.

Ans :

Uttarayan is the Sun's apparent northward movement from December to June, while Dakshinayan is its apparent southward movement from June to December.

127. What is space junk or space debris and why is it a concern?

Ans :

Space junk consists of non-functional satellites and rocket parts in orbit. It is a concern because it crowds space and could collide with working satellites.

128. Why do the dates of festivals based on a sidereal solar calendar, like Makar Sankranti, slowly shift?

Ans :

These festival dates shift due to the slow wobble of Earth's axis, which causes a small difference between the sidereal and tropical years over time.

129. Who was Meghnad Saha and what was his role in Indian calendar reform?

Ans :

Meghnad Saha was a pioneering Indian astrophysicist who chaired the Calendar Reform Committee, which recommended a uniform national calendar for India.

130. Why might the date of a festival differ by a day between eastern and western India?

Ans :

Festival dates can shift by a day because they are often based on the exact lunar phase at sunrise, which occurs at different times across regions.

131. Who is known as the Father of the Indian Space programme and why?

Ans :

Vikram Ambalal Sarabhai is known as the Father of the Indian Space programme because he pioneered the effort to launch India's first artificial satellites.

132. How can one spot an artificial satellite in the night sky?

Ans :

An artificial satellite can be spotted as a moving point of light with steady or flickering brightness that moves very fast across the night sky.

133. On what day does the year begin in the Indian National Calendar?

Ans :

The year in the Indian National Calendar begins on March 22, which is the day that immediately follows the spring equinox in most years.

134. How did ancient astronomers, according to the Surya Siddhanta, determine the winter solstice?

Ans :

They noted that the star pattern of Capricorn (Makar) would be in the background of the Sun around the time of the winter solstice.

NODIA

135. What is the defining characteristic of a gibbous phase of the Moon?

Ans :

The gibbous phase is when more than half of the illuminated portion of the Moon is visible from the Earth, occurring during both waxing and waning periods.

Download INDIA's Best Study app NODIA

136. Explain why one half of the Moon is always illuminated.

Ans :

The half of the Moon that is facing the Sun constantly receives sunlight and therefore remains illuminated, while the other half remains dark.

137. What is the defining characteristic of a crescent phase of the Moon?

Ans :

The crescent phase occurs when less than half of the illuminated portion of the Moon is visible from Earth, seen shortly after or before a new Moon.

138. Why don't you see the illuminated part of the Moon on a new Moon day?

Ans :

On a new Moon day, only the non-illuminated portion of the Moon is facing the Earth, making its bright, sunlit side invisible to us.

TRUE AND FALSE

88. The different phases of the Moon are caused by the Earth's shadow falling on the Moon's surface.

Ans :

False
The phases of the Moon are not caused by the Earth's shadow; they occur because we see different amounts of the Moon's sunlit half as it revolves around the Earth.

89. The Moon generates its own light, which is why we can see it in the night sky.

Ans :

False
The Moon does not emit its own light but shines because it reflects the sunlight that falls on it.

90. The period when the visible bright portion of the Moon is increasing is called the waxing period.

Ans :

True
The period when the bright part of the Moon increases is called the waxing period. In India, this is also known as Shukla Paksha.

91. A lunar eclipse can happen only on a full Moon day.

Ans :

True
Lunar eclipses can only occur on a full Moon day, and solar eclipses can only happen on a new Moon day.

92. The complete cycle of the Moon's phases, from one new Moon to the next, takes about one week.

Ans :

False
The cycle from one full Moon to the next, which is a full cycle of phases, takes about a month (approximately 29.5 days).

93. Solar calendars, such as the widely used Gregorian calendar, add a leap day every four years to stay synchronized with the seasons.

Ans :

True
To adjust for the Earth's revolution taking about 365 and a quarter days, solar calendars add an extra day every four years, known as a leap year.

94. A lunar year, consisting of 12 lunar months, is the same length as a solar year.

Ans :

False
A lunar year is approximately 354 days long, which is about 11 days shorter than a solar year.

95. The basic unit of a "day" in a calendar is based on the time it takes for the Moon to revolve around the Earth.

Ans :

False
The natural cycle of a day is a unit of time that is based on the rotation of the Earth on its own axis.

96. Luni-solar calendars combine lunar months with an occasional extra month to keep the calendar aligned with the solar seasons.

Ans :

True
Luni-solar calendars add an extra month (called Adhika Maasa) every few years to keep the lunar cycle in step with the solar year.

97. The Moon always rises at the exact same time every day.

Ans :

False
The Moon rises approximately 50 minutes later each day because of its continuous movement in its orbit around the Earth.

98. A new Moon occurs when the side of the Moon facing the Earth is not illuminated by the Sun.

Ans :

True
On a new Moon day, we cannot see the Moon because only its non-illuminated portion is facing the Earth.

99. The Moon is the Earth's only artificial satellite.

Ans :

False
The Moon is Earth's natural satellite. Artificial satellites are man-made objects that have been launched into space to orbit the planet.

100. Many Indian festivals, such as Diwali and Holi, are timed according to the phases of the Moon.

Downloaded from www.pdf.tube

Ans :

The correct explanation for the Moon's phases is:

- The phases are caused by the changing orientation of the Sun, Moon, and Earth.
- We see different portions of the Moon's sunlit half as it revolves around us.
- The Earth's shadow falling on the Moon causes a lunar eclipse, not the regular phases.
- Lunar eclipses only happen on a full Moon day and are rare events.

148. Why were luni-solar calendars developed, and how do they work?

Ans :

Luni-solar calendars were created to combine the day and month tracking of lunar calendars with the seasonal accuracy of solar calendars. A lunar year is about 11 days shorter than a solar year. To correct this drift, an extra month, known as Adhika Maasa, is added every two to three years, keeping festivals aligned with the appropriate seasons.

149. How can observing the shortest shadow of a vertical stick help determine a mean solar day?

Ans :

This method helps determine a mean solar day by:

- Marking the tip of a stick's shadow reveals that the shadow is shortest when the Sun is at its highest point.
- Recording the time of this shortest shadow on two consecutive days.
- The duration between these two moments is the solar day.
- Averaging this duration over several days gives the mean solar day, which is 24 hours.

150. Describe the functions of three different ISRO space missions mentioned in the text.

Ans :

Three key ISRO missions include Cartosat, AstroSat, and Mangalyaan. Cartosat is a series of Earth observation satellites that capture high-quality images for mapping and disaster management. AstroSat is a space mission dedicated to making scientific observations of stars and other celestial objects. Mangalyaan was India's successful Mars Orbiter Mission that studied the Martian atmosphere and surface.

151. How do solar calendars, like the Gregorian, account for the exact length of Earth's revolution?

Ans :

The Earth's revolution takes about 365.25 days. The Gregorian calendar addresses this by:

- Having a standard year of 365 days.
- Adding a leap day every four years to a year divisible by four.
- Skipping leap years in century years not divisible by 400 (e.g., 1900).
- Re-adding the leap year every 400 years (e.g., 2000) for long-term accuracy.

152. The table compares three types of calendars. Based on the information provided, explain why a luni-solar calendar requires the addition of an 'intercalary month' (Adhika Maasa).

Calendar Type	Basis	Length of Year	Synchronised with Seasons?
Solar	Earth's revolution around the Sun	~365 days	Yes
Lunar	Moon's phases	~354 days	No
Luni-solar	Both Moon's phases and Earth's revolution	~354 days + adjustments	Yes

Ans :

A lunar year of 354 days is about 11 days shorter than a solar year of 365 days, causing it to fall out of sync with the seasons. To correct this, a luni-solar calendar adds an extra month every few years to align the lunar months with the solar seasons.

153. What is the difference between Amant and Purnimant calendars used in India?

Ans :

Both Amant and Purnimant are types of luni-solar calendars that use the same month names like Chaitra and Vaisakha. The primary difference lies in their starting point for a new month. In Amant calendars, the new month begins on the first day after the new Moon. In Purnimant calendars, the new month starts on the day after the full Moon.

NODIA
Download INDIA's Best Study app NODIA

181. Why do festivals tied to luni-solar calendars shift on the Gregorian calendar, while those tied to purely lunar calendars shift more drastically?

Ans :

The shifting of festival dates is due to the different year lengths of each calendar system:

- **Luni-solar Calendars** : A lunar year (~354 days) is shorter than a solar year (~365 days). Luni-solar calendars periodically add an intercalary month to correct this 11-day difference. This correction keeps festivals within the same season, causing their Gregorian dates to shift by less than a month.
- **Purely Lunar Calendars** : These calendars do not add an extra month. Their ~354-day year continuously falls behind the Gregorian calendar by about 11 days annually. As a result, festivals like Eid-ul-Fitr drift backward through all seasons and months of the Gregorian calendar over time.

182. Describe the waxing and waning periods of the Moon, including the major phases within each period.

Ans :

The monthly cycle of the Moon is divided into two main periods:

- **Waxing Period (Shukla Paksha)** : This is the two-week period when the visible bright portion of the Moon increases. It begins after the new Moon with a thin crescent, grows to a half-moon (first quarter), then to a gibbous shape, and culminates in a full Moon.
- **Waning Period (Krishna Paksha)** : This is the two-week period when the visible bright portion decreases. It starts after the full Moon, shrinks to a gibbous shape, then to a half-moon (third quarter), becomes a thin crescent, and finally disappears at the new Moon.

183. Discuss the various uses of artificial satellites and mention some specific missions launched by ISRO.

Ans :

Artificial satellites are man-made objects orbiting Earth with a wide range of important functions:

- **Applications** : They are crucial for modern life, enabling communication (phones, TV, internet), navigation (GPS), weather monitoring and forecasting, disaster management, and scientific research.
- **ISRO Missions** : The Indian Space Research Organisation (ISRO) has launched many such satellites. Examples include the Cartosat series for high-resolution mapping and city planning, AstroSat for astronomical observations of stars, Chandrayaan missions to the Moon, and the Mangalyaan mission to Mars. ISRO also supports student-built satellites like Jugnu.

184. Explain how an intercalary month (Adhika Maasa) functions in a luni-solar calendar and why it is necessary.

Ans :

The necessity and function of an intercalary month are as follows:

- **The Problem** : A year based on 12 lunar months is about 354 days long, which is approximately 11 days shorter than a solar year of 365 days. Without correction, this causes lunar-based festivals to drift out of their traditional seasons.
- **The Solution** : A luni-solar calendar resolves this issue by adding an extra month, known as Adhika Maasa, to the year.
- **The Mechanism** : This extra month is inserted every two to three years, when the accumulated difference between the lunar and solar years becomes close to a full month. This resets the alignment and ensures that festivals remain in sync with the seasons.

185. How does knowing the Moon's phase help in locating it in the sky at different times of the day?

Ans :

The Moon's phase is directly related to its position relative to the Sun, which determines its visibility:

- **Full Moon** : The Moon is opposite the Sun. It rises in the east as the Sun sets in the west and is visible all night.
- **New Moon** : The Moon is near the Sun in the sky and is generally not visible.
- **Waxing Moon** : This phase is best spotted in the afternoon and evening sky, typically setting after the Sun. A waxing crescent is seen at sunset.
- **Waning Moon** : This phase is best spotted in the late night and morning sky, rising before the Sun. A waning crescent is seen at sunrise.

Therefore, the phase tells us when and where to look for the Moon.

Click Here to Buy book on Amazon

161. Describe the contribution of Vikram Sarabhai to India's space exploration efforts.

Ans :

Vikram Sarabhai is considered the Father of the Indian Space programme. His key contributions include:

- He pioneered the national effort to develop and launch India's first artificial satellites.
- His work in space science and nuclear physics laid the foundation for India's modern space agency, ISRO.
- The Vikram Sarabhai Space Centre (VSSC), which develops rockets and launch vehicles, is named in his honor.

162. Explain how ancient Indian astronomers determined the length of a year without modern instruments.

Ans :

Ancient Indian astronomers made careful, long-term observations of the sky. They noticed that the Sun's rising position shifted north and south between two extreme points, the solstices, over a year. This cycle of the Sun's apparent movement, known as Uttarayan and Dakshinayan, repeats annually and allowed them to determine the year's length was approximately 365 days.

163. How is it possible to see the Moon during the daytime?

Ans :

The Moon is visible during the day because it is always in the sky, but its visibility depends on its phase and position relative to the Sun. It shines by reflecting sunlight, which is bright enough to be seen even when the Sun is up. Whether we see it depends on it being high enough in the sky and far enough from the Sun's glare.

Download INDIA's Best Study app NODIA

164. What happens to the position of the Moon in the sky if you observe it at the same time on consecutive days?

Ans :

If you observe the Moon at the same time each day, for example at sunrise, you will notice its position has shifted. This occurs because as the Earth rotates, the Moon is also moving in its orbit around the Earth. Therefore, the Moon appears in a different part of the sky and rises and sets at a different time each day.

165. Why are many Indian festivals, such as Diwali and Eid-ul-Fitr, linked to specific phases of the Moon?

Ans :

These festivals are based on luni-solar or lunar calendars, which use the Moon's phases to mark dates. For instance:

- Diwali is celebrated on the new Moon day of the month of Kartika.
- Holi occurs on the full Moon of Phalguna.
- Eid-ul-Fitr is celebrated after sighting the crescent Moon at the end of Ramazan.

This celestial timekeeping has deep cultural and religious significance.

166. The table lists some Indian festivals and the lunar phases on which they are celebrated. Explain why the dates for these festivals change every year on a solar calendar like the Gregorian calendar.

Festival	**Lunar Phase**
Diwali	New Moon (Amavasya)
Holi	Full Moon (Purnima)
Eid-ul-Fitr	Sighting of Crescent Moon
Buddha Purnima	Full Moon (Purnima)

Ans :

These festivals are based on the lunar calendar, which follows the Moon's phases. Since a lunar year (\~354 days) is shorter than a solar year (\~365 days), the date of a specific lunar phase, like a full moon, shifts by about 11 days each year on the Gregorian calendar.

167. What is the risk associated with space debris and what is being done about it?

Ans :

Space debris, or space junk, consists of defunct satellites and rocket parts orbiting Earth. The primary risk is that this debris can collide with and damage operational satellites, disrupting services like communication and navigation. While small debris burns up in the atmosphere upon re-entry, larger pieces can survive and crash on the ground. Countries are now collaborating on strategies to remove this dangerous debris.

Downloaded from www.pdf.tube

190. In a grassland, grass is eaten by grasshoppers, rabbits, and deer. Grasshoppers are eaten by frogs and lizards. Rabbits are eaten by foxes and eagles. This complex network of interconnected food chains is known as a food web. It shows that most animals are part of multiple food chains, making the ecosystem more stable than a single food chain.

Questions:

1. How is a food web different from a food chain?
2. Name one organism from this food web that is a secondary consumer.
3. Why is a food web considered a more realistic representation of feeding relationships in an ecosystem?

Ans :

1. A food web is a network of many interconnected food chains, while a food chain is a single linear path of energy flow.
2. A frog (eats grasshopper), lizard (eats grasshopper), or fox (eats rabbit) is a secondary consumer.
3. It is more realistic because most animals eat more than one type of food and are eaten by more than one type of predator, showing the complex and multiple pathways of energy flow.

191. A desert ecosystem has very specific non-living, or abiotic, components. These include high temperatures, intense sunlight, very little water, and sandy soil. These abiotic factors directly influence which living, or biotic, organisms can survive there. For example, plants like cacti have adaptations to conserve water, and animals are often nocturnal to avoid the intense daytime heat.

Questions:

1. What are the non-living components of an ecosystem called?
2. List two abiotic factors mentioned that are characteristic of a desert.
3. How do the abiotic factors of a desert influence the behavior of the animals that live there?

Ans :

1. They are called abiotic components.
2. Two abiotic factors are intense sunlight and very little water (or high temperature/sandy soil).
3. Abiotic factors like intense heat cause many desert animals to be nocturnal (active at night) to avoid high daytime temperatures, demonstrating the influence of the environment on behavior.

192. After a tree falls in a forest, it does not just lie there forever. Microorganisms like fungi and bacteria, known as decomposers, begin to break it down. They use the dead wood as food, releasing the stored nutrients back into the soil. Without these essential decomposers, the ecosystem would be buried in dead organic matter and the nutrient cycle would stop.

Questions:

1. To which category of biotic components do fungi and bacteria belong?
2. What is the main function of decomposers in an ecosystem?
3. How is the role of decomposers different from the role of producers in terms of nutrient flow?

Ans :

1. They belong to the category of decomposers.
2. Their main function is to break down dead organic matter and waste products into simpler substances.
3. Producers take up nutrients from the environment to build organic matter. Decomposers do the opposite; they break down organic matter and return the nutrients to the environment, completing the cycle.

NODIA

193. A bear in a forest eats berries and plants, but it also hunts for fish and small mammals. Because the bear eats both plants (producers) and animals (consumers), it is classified as an omnivore. In a food web, an omnivore can occupy multiple consumer levels, acting as a primary consumer when eating plants and a secondary or tertiary consumer when eating other animals.

Questions:

1. What is an animal that eats both plants and animals called?
2. When the bear eats berries, at which consumer level is it feeding?
3. How does being an omnivore give an animal like a bear a survival advantage?

Ans :

1. An animal that eats both plants and animals is called an omnivore.
2. When eating berries (producers), the bear is acting as a primary consumer.
3. Being an omnivore provides a wider variety of food sources, which increases the animal's

Date	Time of Shortest Shadow (hh:mm)	Duration of Day (hh:mm)
22 March 2025	12:20	—
23 March 2025	12:20	24:00
24 March 2025	12:19	23:59

Ans :

This experiment measures the duration of a solar day, which is the time taken for the Sun to return to its highest position in the sky. This daily cycle is caused by the rotation of the Earth on its own axis, which makes the Sun appear to move across the sky.

177. What is the function of the Rashtriya Panchang published by the Government of India?

Ans :

The Rashtriya Panchang is a detailed astronomical calculation published annually by India's Positional Astronomy Center. Its primary functions are:

- To provide precise positions of celestial objects like the Sun and Moon.
- To give advance, uniform dates for festivals across the country.
- This ensures uniformity in holiday declarations by the Government of India, resolving regional timing differences.

LONG ANSWER QUESTIONS

178. Explain in detail how the three primary natural astronomical cycles form the basis for our main units of time.

Ans :

Our main units of time are derived from three predictable astronomical cycles:

- **The Day** : This unit is based on the Earth's rotation on its own axis. The apparent daily motion of the Sun from rising to setting and returning to its highest point the next day defines a solar day, which averages 24 hours.
- **The Month** : This unit is based on the Moon's revolution around the Earth. The Moon takes about 29.5 days to complete a full cycle of its phases (e.g., from one new Moon to the next), which became the basis for the lunar month.
- **The Year** : This unit is based on the Earth's revolution around the Sun. It takes about 365.25 days for the Earth to complete one orbit, causing the cycle of seasons. This duration defines the solar year.

179. Describe the key differences between lunar, solar, and luni-solar calendars, explaining why each type was developed.

Ans :

These three calendar types were developed to track time using different celestial cycles:

- **Lunar Calendars** : These are based solely on the phases of the Moon, with a year consisting of 12 lunar months totaling about 354 days. They are simple to follow by observing the Moon but fall out of sync with the seasons.
- **Solar Calendars** : These were developed for agricultural needs, tying the calendar to the seasons. Based on Earth's 365.25-day revolution around the Sun, they use mechanisms like leap years to maintain alignment with the solar year and seasons.
- **Luni-solar Calendars** : These are a hybrid system created to reconcile lunar and solar cycles. They primarily use lunar months but add an extra "intercalary month" (Adhika Maasa) every 2-3 years to ensure the calendar stays synchronized with the solar year and its seasons.

180. Using an activity as a model, explain why we see different phases of the Moon from Earth.

Ans :

The phases are explained by an activity where your head is Earth, a lamp is the Sun, and a ball held at arm's length is the Moon:

- The Moon (ball) does not produce its own light; it reflects sunlight (from the lamp). Half of the ball is always lit.
- As you turn (representing the Moon's orbit), the amount of the lit side of the ball you can see changes.
- When the ball is between you and the lamp (New Moon), you see none of its lit side.
- When you are between the lamp and the ball (Full Moon), you see the entire lit side.
- At other positions, you see partial views like crescents and gibbous shapes, demonstrating that phases depend on the Moon's position relative to the Earth and Sun.

Click Here to Buy book on Amazon

154. Explain why a waning Moon is best observed at sunrise.

Ans :

As the Moon progresses through its waning phase after a full Moon:

- It appears to move closer in the sky to the Sun each day.
- On a full Moon, it sets in the west as the Sun rises in the east.
- In the following days, it is still visible in the sky during morning hours.
- This positioning makes the waning phases, like the crescent, most convenient to observe around sunrise.

155. Describe how the Moon's appearance changes during its two-week waning period.

Ans :

The waning period begins the day after a full Moon. The bright, visible portion starts to decrease from a full circle. In about a week, it becomes a half circle. The bright part continues to shrink over the next week, appearing as a crescent before it becomes completely invisible on the new Moon day, marking the end of the waning period.

156. Why is it incorrect to assume the Moon only rises when the Sun sets?

Ans :

This assumption is incorrect for several reasons:

- Only on a full Moon day does the Moon rise at approximately the same time the Sun sets.
- The Moon's rise time shifts by about 50 minutes later each day.
- This daily shift means that moonrise can occur at any time, including in the afternoon.
- Therefore, it is common to see the Moon in the sky during daylight hours.

157. What are artificial satellites, and what are some of their key applications?

Ans :

Artificial satellites are human-made objects launched into orbit around the Earth. They serve many vital functions that benefit society. Their applications include global communication for phones and internet, navigation systems like GPS, monitoring weather patterns and climate, managing natural disasters by providing timely information, and conducting scientific research about space and our planet.

158. How has the Moon and moonlight influenced various forms of Indian art?

Ans :

The Moon and its light have inspired many Indian art forms:

- **Music** : Several ragas in Indian classical music, like Chandrakauns, are named after and evoke the imagery of the Moon.
- **Dance** : Classical dances such as Bharatanatyam use hand gestures (mudras) like Chandrakala, which relate to the Moon.
- **Painting & Sculpture** : Traditional art styles like Warli and tribal art forms prominently feature depictions of the Moon.

159. A student records observations of the Moon for three consecutive days after a Full Moon. Based on the trend shown in the table, what is this period of the lunar cycle called, and what phase will the Moon eventually reach?

Day	**Appearance of Moon**	**Size of Bright Portion Compared to Previous Day**	**Moon and Sun Separation**
1	Full Moon	—	—
2	Gibbous (waning)	Decreased	Closer
3	Gibbous (waning)	Decreased	Closer

Ans :

This period is called the waning period, or Krishna Paksha, as the Moon's visible bright portion is decreasing each day. If this trend continues for about two weeks, the Moon will eventually become completely invisible, reaching the New Moon phase.

160. Why is a lunar year shorter than a solar year? Explain the duration of each.

Ans :

A lunar year's length is determined by the Moon's cycles, while a solar year is based on the Earth's orbit. A lunar month is about 29.5 days, so a 12-month lunar year is approximately 354 days long. A solar year, the time for Earth to orbit the Sun, is about 365.25 days. This makes the lunar year nearly 11 days shorter.

NODIA

186. Detail the structure of the Gregorian calendar and the complex rules it uses for leap years.

Ans :

The Gregorian calendar is the most widely used solar calendar, designed to align with the seasons:

- **Basic Structure** : It has 12 months of varying lengths (28, 30, or 31 days) to make a standard year of 365 days.
- **Primary Leap Year Rule** : To account for the Earth's orbit being ~365.25 days, it adds an extra day (February 29) in a leap year, which occurs every year divisible by four.
- **Century Year Correction** : To correct for a slight over-addition, leap years are skipped in years divisible by 100, such as 1700, 1800 and 1900.
- **400-Year Correction** : To fine-tune the calendar further, the leap year is added back in years divisible by 400, such as 1600 and 2000. These corrections keep the calendar highly accurate over long periods.

187. Discuss the significance of Meghnad Saha and Vikram Sarabhai in the context of Indian science.

Ans :

Both scientists made foundational contributions to different fields of Indian science:

- **Meghnad Saha** : He was a pioneering astrophysicist who developed the famous Saha equation to study star temperatures. His scientific leadership extended to practical applications, as he was the chairperson of the Calendar Reform Committee. This committee was instrumental in developing the uniform Indian National Calendar, blending scientific accuracy with cultural heritage.
- **Vikram Sarabhai** : Known as the Father of the Indian Space Programme, he was a visionary in space science. He led the effort to establish India's capabilities in space, pioneering the launch of its first artificial satellites. His work laid the groundwork for ISRO and its subsequent achievements in space exploration and technology.

CASE BASED QUESTIONS

188. A forest ecosystem contains trees and plants (producers) that make their own food using sunlight. Deer (primary consumers) eat the plants, and tigers (secondary consumers) hunt the deer. When these organisms die, bacteria and fungi (decomposers) break them down, returning nutrients to the soil. Sunlight, water, and soil are the non-living abiotic components that support this entire system.

Questions:

1. What are the living components of an ecosystem called?
2. In this forest ecosystem, identify the producers and the secondary consumers.
3. What is the crucial role of decomposers like bacteria and fungi in this ecosystem?

Ans :

1. The living components of an ecosystem are called biotic components.
2. The producers are the trees and plants; the secondary consumers are the tigers.
3. Decomposers break down dead organisms and their waste products, which helps in recycling essential nutrients back into the soil for the producers to use.

189. In a pond, tiny aquatic plants called algae act as producers. Small fish eat these algae, and larger fish then eat the small fish. Finally, a kingfisher bird preys on the larger fish. This linear sequence of "who eats whom" represents a food chain, showing the one-way flow of energy from the sun to the producers and then through the different consumers.

Questions:

1. What is a sequence that shows how energy is transferred from one living organism to another called?
2. Identify the primary consumer and the tertiary consumer in this pond food chain.
3. What would likely happen to the population of small fish if a disease wiped out most of the algae?

Ans :

1. It is called a food chain.
2. The primary consumer is the small fish (eats algae), and the tertiary consumer is the kingfisher bird (eats large fish).
3. The population of small fish would likely decrease due to the loss of their primary food source, the algae.

Downloaded from www.pdf.tube

168. Describe the key features of the two-week waxing period of the Moon.

Ans :

The waxing period begins after the new Moon day, when the Moon is not visible. The process involves:

- The visible bright portion of the Moon starts to grow.
- It appears as a thin crescent at first.
- In about one week, it grows to a half circle.
- It continues to increase in size, through a gibbous phase, until it becomes a full circle on the full Moon day.

169. Explain the difference between a sidereal year and a tropical year.

Ans :

Both are types of solar years but are measured differently. A tropical year is the time between two consecutive spring equinoxes and is linked to the cycle of seasons. A sidereal year is the time it takes for the same stars to appear at sunset again, tracking Earth's position relative to distant stars. The sidereal year is about 20 minutes longer.

170. What was the purpose of the Calendar Reform Committee (CRC) set up in 1952?

Ans :

The Government of India established the Calendar Reform Committee (CRC) to address the issue of multiple different calendars being used across the country. Its purpose was to examine all existing calendars and recommend a single, accurate, and uniform national calendar that could be used for official purposes throughout India, leading to the adoption of the Indian National Calendar.

171. How does a full cycle of the Moon's phases relate to a calendar month?

Ans :

The full cycle of the Moon, from one new Moon to the next, takes approximately 29.5 days. This predictable and easily observable natural cycle became the basis for the "month" as a fundamental unit for measuring time in many ancient and modern calendar systems, especially lunar and luni-solar calendars. The term "month" itself is derived from the word "Moon."

172. If you see a half Moon overhead at sunset, is it in the waxing or waning phase?

Ans :

If a half Moon is visible overhead at sunset, it must be in its waxing phase. During the waxing period, the Moon becomes visible in the sky in the afternoon and evening. The first quarter (half Moon) phase of the waxing cycle is high in the sky around sunset, whereas the waning half Moon is seen around sunrise.

NODIA

173. Explain why the Moon appears to move closer to the Sun in the sky during the waning period.

Ans :

On a full Moon day, the Moon is opposite the Sun in the sky. As it moves through its orbit during the waning period, its position shifts eastward relative to the Sun. When observed at the same time each day (e.g., sunrise), this orbital motion makes the Moon appear progressively closer to the Sun's position in the sky.

174. How do we know ancient Indians tracked solstices, according to the Taittirlya Samhita?

Ans :

The ancient Indian text, Taittirlya Samhita, provides clear evidence of tracking solstices with a verse that states:
" Thus the Sun moves southwards for six months and northwards for six months."
This accurately describes the Sun's apparent annual journey between the winter and summer solstices, which are the extreme points of its southward and northward movement (Dakshinayan and Uttarayan).

175. How does the small tilt in the Moon's orbit prevent monthly eclipses?

Ans :

For an eclipse to occur, the Sun, Earth, and Moon must be perfectly aligned. Although this alignment seems possible at every full and new Moon, the Moon's orbit is slightly tilted relative to Earth's orbit. Because of this tilt, the Moon usually passes just above or below Earth's shadow (at full Moon) or its shadow misses Earth (at new Moon).

176. A student measures the time when a vertical stick casts its shortest shadow for three consecutive days. What fundamental unit of time is being measured in this experiment, and what astronomical motion causes this daily cycle?

chances of survival if one particular food source becomes scarce.

194. In a particular ecosystem, wolves prey on deer. If humans hunt and remove most of the wolves, the deer population might increase dramatically. This overpopulation of deer could lead to overgrazing, destroying the plant life (producers). This shows how removing one component can disrupt the ecological balance and affect the entire ecosystem.

Questions:

1. What is meant by ecological balance?
2. In this scenario, what is the initial effect of removing the wolves?
3. Explain how the removal of a predator (wolf) can ultimately lead to the destruction of the producers (plants).

Ans :

1. Ecological balance is a state in which the numbers of organisms at each trophic level in an ecosystem remain relatively stable.
2. The initial effect is a dramatic increase in the population of deer.
3. The increased deer population will eat too many plants (overgrazing), which can lead to the destruction of the plant life in the ecosystem, disrupting the entire food web.

195. All the energy in most ecosystems on Earth can be traced back to the sun. Green plants, the producers, capture this solar energy and convert it into chemical energy through photosynthesis. This chemical energy is then passed along the food chain when consumers eat the plants and other animals. Without sunlight, most life on Earth could not exist.

Questions:

1. What is the process by which green plants make their own food using sunlight?
2. How does the sun's energy get transferred to a herbivore like a rabbit?
3. The energy "flows" through an ecosystem, while nutrients are "cycled." What is the main difference?

Ans :

1. The process is called photosynthesis.
2. The sun's energy is first captured by plants (producers). The rabbit then gets this energy by eating the plants.
3. Energy flows in one direction and is lost at each step (as heat), so it cannot be reused. Nutrients are not lost; they are constantly recycled back into the ecosystem by decomposers.

196. Consider the following food chain from a field : Corn → Rat → Snake. In this sequence, the corn plant is the producer, as it makes its own food. The rat, which eats the corn, is the primary consumer. The snake, which eats the rat, is the secondary consumer. Energy flows from the corn to the rat, and then to the snake.

Questions:

1. What is an organism that eats only plants called?
2. In the food chain Corn → Rat → Snake, identify the producer and the secondary consumer.
3. If an eagle eats the snake, what trophic level would the eagle occupy?

Ans :

1. An organism that eats only plants is called a herbivore.
2. The producer is the corn, and the secondary consumer is the snake.
3. The eagle would be a tertiary consumer, as it would be eating the secondary consumer.

197. Soil is a vital abiotic component of a terrestrial ecosystem. It provides anchorage for plants, is a source of water and essential nutrients for producers, and serves as a home for countless decomposers like bacteria and fungi. The quality and composition of the soil directly determine the type of plants that can grow, thus shaping the entire food web.

Questions:

1. Is soil a biotic or an abiotic component of an ecosystem?
2. List two ways in which soil supports the producers in an ecosystem.
3. How does the role of soil connect the biotic and abiotic parts of an ecosystem?

Ans :

1. Soil is an abiotic component.
2. Soil provides anchorage for plants and is a source of water and nutrients.
3. Soil connects the biotic and abiotic parts by being the medium through which producers (biotic) get nutrients and water (abiotic), and where decomposers (biotic) return nutrients from dead organisms back into the abiotic environment.

Click Here to Buy book on Amazon

198. A student sets up a small aquarium. She adds water, gravel, and some aquatic plants like Hydrilla. She then adds a few small snails that eat the algae and decaying plant matter. The plants act as producers, providing oxygen, while the snails act as primary consumers and help in cleaning. This closed system demonstrates a miniature, simplified ecosystem.

Questions:

1. What is an ecosystem?
2. In the aquarium, identify one biotic component and one abiotic component.
3. If the student did not add plants, why would the snails eventually die even if she provided food?

Ans :

1. An ecosystem is a community of living organisms interacting with their non-living physical environment.
2. A biotic component is the plants or snails. An abiotic component is the water or gravel.
3. The snails would die because the plants, through photosynthesis, provide the dissolved oxygen that the snails need to breathe. Without plants, the oxygen would run out.

199. A large area of forest is cleared for agriculture and building houses. This act of deforestation destroys the habitat for many animals, leading to a loss of biodiversity. It also removes producers from the ecosystem, disrupting food chains and affecting the water and nutrient cycles. This shows how human activities can have a severe negative impact on ecological balance.

Questions:

1. What is the term for the variety of life in an ecosystem?
2. How does deforestation directly affect the producers of the forest ecosystem?
3. Besides destroying habitats, how might clearing a forest affect the local climate, which is an abiotic factor?

Ans :

1. The variety of life is called biodiversity.
2. Deforestation directly removes the producers (trees and other plants), which form the base of the entire ecosystem's food web.
3. Clearing forests can lead to less rainfall and increased temperatures, thus altering the local climate, which is a key abiotic factor.

Download INDIA's Best Study app NODIA

200. A lion patiently stalks a zebra in the African savanna. The lion is a carnivore, an animal that eats other animals. As a consumer, it plays a vital role in controlling the population of herbivores like zebras. By doing so, predators like the lion help maintain the ecological balance and prevent herbivores from overgrazing and destroying the grassland producers.

Questions:

1. What is an animal that feeds on other animals called?
2. In the relationship between the lion and the zebra, which is the predator and which is the prey?
3. What would happen to the savanna's grasses if a disease eliminated the lion population?

Ans :

1. An animal that feeds on other animals is called a carnivore.
2. The lion is the predator, and the zebra is the prey.
3. Without lions to control their population, the number of zebras could increase significantly, leading to overgrazing that could damage or destroy the savanna's grasses.

NODIA

201. In a forest, both foxes and eagles prey on rabbits. This means the fox and the eagle are in competition for the same food resource. If the population of rabbits decreases due to a dry season that reduces plant growth, the competition between foxes and eagles will become more intense, potentially affecting the survival of both predators.

Questions:

1. What does it mean for two species to be in competition?
2. What is the limited resource that the foxes and eagles are competing for?
3. How does a change in an abiotic factor (a dry season) lead to increased competition between two biotic components (foxes and eagles)?

Ans :

1. It means they both require and use the same limited resource, such as food or space.
2. They are competing for rabbits as a food resource.
3. The dry season (abiotic factor) reduces plant growth, which in turn reduces the rabbit population (biotic component). The scarcity of this food source increases the competition between the predators that rely on it.

202. Vultures are often seen circling over dead animals. They are scavengers, a type of consumer that feeds on the carcasses of dead animals. While they don't hunt live prey, they play a crucial role by cleaning up dead organic matter. This helps prevent the spread of diseases and speeds up the process of returning nutrients to the ecosystem.

Questions:

1. What is an animal that feeds on the bodies of dead animals called?
2. Is a vulture a producer, consumer, or decomposer?
3. How is the role of a scavenger like a vulture similar to, yet different from, the role of decomposers like bacteria?

Ans :

1. An animal that feeds on dead animals is called a scavenger.
2. A vulture is a type of consumer.
3. Their role is similar because both break down dead organic matter. It is different because vultures break it down physically by eating it, while decomposers break it down chemically into simpler substances.

****

NODIA

the ecosystem clean. In nature, thanks to decomposers, nothing is wasted.

3. Selvam from Cuddalore district, Tamil Nadu, shared that his village was less affected by the 2004 Tsunami compared to nearby villages due to the presence of mangrove forests. This surprised Sarita, Shabnam, and Shijo. They wondered if mangroves were protecting the village. Can you help them understand this?

Ans :

Yes, the mangrove forests were indeed protecting the village. Mangrove forests act as a natural protective barrier for coastal areas. Their dense and complex root systems hold the soil firmly and absorb the energy of strong waves and winds during tsunamis, storms, and floods. This slows down the water and reduces its destructive force, thus protecting the villages located behind them.

4. Look at this food chain:
Grass →Grasshopper →Frog →Snake
If frogs disappear from this ecosystem, what will happen to the population of grasshoppers and snakes? Why?

Ans :

If frogs disappear from this food chain, it would cause an imbalance in the ecosystem:

1. The population of grasshoppers would likely increase because their main predator (the frog) has been removed.
2. The population of snakes would likely decrease because they have lost a primary source of food (the frog).

This demonstrates how organisms in an ecosystem are interconnected, and removing one can affect the populations of others.

5. In a school garden, students noticed fewer butterflies the previous season. What could be the possible reasons? What steps can students take to have more butterflies on campus?

Ans :

Possible reasons for fewer butterflies:

1. Use of chemical pesticides in the garden that could harm or kill butterflies.
2. A lack of native flowering plants that provide nectar for adult butterflies and leaves for their caterpillars.
3. Changes in local weather patterns or an increase in pollution.

Steps to attract more butterflies:

1. Plant a variety of local, nectar-rich flowering plants.
2. Avoid using synthetic pesticides and use natural pest control methods instead.
3. Create small, shallow water sources for butterflies to drink from.
4. Ensure there are host plants for caterpillars to feed on.

6. Why is it not possible to have an ecosystem with only producers and no consumers or decomposers?

Ans :

It is not possible to have an ecosystem with only producers for a few key reasons:

1. Nutrient Depletion : Producers, like plants, absorb nutrients from the soil to grow. Without decomposers to break down dead producers and recycle their nutrients back into the soil, the soil would eventually become infertile, and the producers would die out.
2. Overpopulation : Without consumers (herbivores) to eat them, the population of producers would grow uncontrollably, leading to competition for resources like sunlight, water, and space.
3. No Energy Transfer : The energy captured by producers would not be transferred to other trophic levels, causing the entire flow of energy in the ecosystem to halt.

7. Observe two different places near your home or school (e.g., a park and a roadside). List the living and non-living components you see. How are the two ecosystems different?

Ans :

This answer depends on your local observation. Here is an example:

Component	**Park Ecosystem <01F333>**	**Roadside Ecosystem <01F6E3>**
Living (Biotic)	Grass, trees, flowers, birds, squirrels, insects, earthworms.	A few weeds, ants, maybe a stray dog or cat.
Non-living (Abiotic)	Soil, sunlight, air, water (from a pond or tap), benches.	Asphalt/tar, dust, sunlight, air (with vehicle fumes), stones.

Downloaded from www.pdf.tube

3.2 Other Relationships (Symbiosis)

Organisms interact in ways other than just eating each other.

1. Mutualism : A relationship where both organisms benefit (e.g., a bee gets nectar from a flower, and the flower gets pollinated).
2. Commensalism : A relationship where one organism benefits, and the other is unaffected(e.g., an orchid growing on a tree branch for support).
3. Parasitism : A relationship where one organism (the parasite) benefits, and the other (the host) is harmed(e.g., a tick feeding on a dog's blood).

4. ECOSYSTEM BALANCE AND HUMAN IMPACT

4.1 The Importance of Balance

An ecosystem is considered balanced when the interactions among its components keep populations and resources stable. Removing even one organism can have a cascading effect on the entire ecosystem, disrupting this balance. For example, a decline in fish can lead to an increase in the insects they eat.

4.2 Human-made Disruptions

Human activities can severely damage ecosystems. Key threats include:

1. Pollution : Contaminating air, water, and soil.
2. Deforestation and Habitat Loss : Clearing forests for agriculture, roads, and cities.
3. Overuse of Resources : Overfishing, over-harvesting, and excessive use of groundwater.
4. Unsustainable Farming : The overuse of synthetic fertilizers and pesticides can degrade soil, harm beneficial microorganisms, and reduce biodiversity.

4.3 Benefits and Conservation of Ecosystems

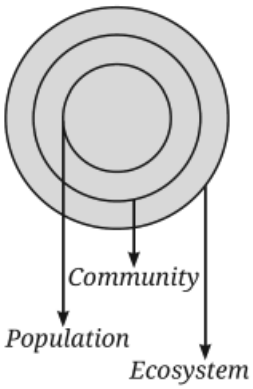
Healthy ecosystems provide essential benefits to humans, including clean air, water, food, medicines, and regulation of the climate. Conservation efforts are crucial to protect these benefits. This includes establishing protected are as like national parks and wildlife sanctuaries to preserve habitats and their wildlife for future generations.

Download INDIA's Best Study app NODIA

NODIA

NCERT EXERCISE

1. Refer to the given diagram (Figure) and select the wrong statement.



Population, community, and ecosystem

(i) A community is larger than a population.
(ii) A community is smaller than an ecosystem.
(iii) An ecosystem is part of a community.
(iv) A population is part of a community.

Ans :

(iii) An ecosystem is part of a community.
An ecosystem is formed by the interaction of a community (all living things) with its abiotic (non-living) environment. Therefore, a community is a part of an ecosystem, not the other way around.

2. A population is part of a community. If all decomposers suddenly disappear from a forest ecosystem, what changes do you think would occur? Explain why decomposers are essential.

Ans :

If decomposers like bacteria and fungi were to disappear, the forest would be filled with piles of dead plants, animals, and waste products. These dead materials would not break down.
Decomposers are essential because they perform decomposition, the process of breaking down complex substances in dead organisms into simpler ones. This process is vital for two main reasons:

1. Nutrient Recycling : It returns important nutrients to the soil, which are then used by plants (producers) to grow. Without decomposers, the nutrient cycle would stop, and the soil would become infertile.
2. Cleaning the Environment : They prevent the build-up of dead organic matter, keeping

12. What is a 'population' in an ecological context?
(A) All the different types of plants and animals in a habitat.
(B) All the non-living things in a habitat.
(C) A group of organisms of the same kind living together in a habitat.
(D) A single organism living by itself.

Ans :

(C) A group of organisms of the same kind living together in a habitat.
A population refers to all the individuals of a single species that live and interact within a particular geographical area. For example, all the deer in a forest constitute the deer population.

13. What is formed when all the different populations of plants, animals, and microorganisms share the same habitat?
(A) An ecosystem (B) An abiotic factor
(C) A trophic level (D) A community

Ans :

(D) A community
A community consists of all the different populations of various species that live and interact with each other in a specific habitat. It represents the "living" or biotic part of an ecosystem.

14. In a forest, deer eat grass and tigers eat deer. This sequence of 'who eats whom' is an example of a _____.
(A) Food chain (B) Food web
(C) Trophic level (D) Population

Ans :

(A) Food chain
A food chain illustrates a simple, linear pathway of energy transfer in an ecosystem. It shows how energy moves from a producer (grass) to a primary consumer (deer) and then to a secondary consumer (tiger).

15. In a food chain, plants that make their own food through photosynthesis are known as _____.
(A) Consumers
(B) Producers
(C) Decomposers
(D) Herbivores

Ans :

(B) Producers
Producers, also called autotrophs, form the base of every food chain. They are organisms, primarily plants and algae, that can create their own food from inorganic sources like sunlight, water, and carbon dioxide.

16. Why are microorganisms like fungi and bacteria called decomposers?
(A) Because they are able to produce their own food using sunlight.
(B) Because they are known to eat other living animals for energy.
(C) Because they break down complex substances in dead organisms.
(D) Because they are the largest living organisms in any ecosystem.

Ans :

(C) Because they break down complex substances in dead organisms.
Decomposers play a crucial role in nutrient cycling. They feed on dead organic matter, such as fallen leaves and dead animals, breaking it down and returning essential nutrients to the soil, which can then be used by plants.

17. What is an ecosystem?
(A) Only the living organisms that can be found in a particular area.
(B) Only the non-living components like the water, rocks, and soil.
(C) A single food chain that shows the flow of energy.
(D) The interaction of the biotic community with abiotic components.

Ans :

(D) The interaction of the biotic community with abiotic components.
An ecosystem is a complete functional unit that includes all the living organisms (the community) in an area, as well as all the non-living physical components of the environment with which they interact.

18. What is the primary difference between a food chain and a food web?
(A) A food chain is one linear path; a food web is many interconnected chains.
(B) A food chain includes decomposers, while a food web does not.
(C) A food web is a single linear path; a food chain is a network.
(D) A food web only includes plants, while a food chain includes animals.

Ans :

Click Here to Buy book on Amazon

Differences : The park is a healthier ecosystem with much higher biodiversity (more types of living things). The abiotic factors, like soil and air quality, are also better. The roadside is a much harsher environment with fewer living organisms, polluted abiotic components, and is heavily influenced by human activity.

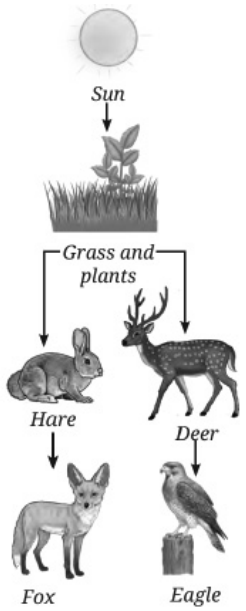
Download INDIA's Best Study app NODIA

8. 'Human-made ecosystems like agricultural fields are necessary, but they must be made sustainable.' Comment on the statement.

Ans :

This statement is correct.
Human-made ecosystems like farms are necessary to produce food for the world's growing population. However, they must be sustainable because modern farming practices can harm the environment. The overuse of synthetic fertilizers and pesticides can degrade soil quality, pollute water, and reduce the population of beneficial organisms like pollinators and natural pest predators. For long-term food security, we need to adopt sustainable farming practices that protect soil health and the environment for future generations.

9. If the Indian hare population (Figure) drops because of a disease, how would it affect the number of other organisms?



Parts of a food web

Ans :

Based on the food web in Figure 12.20, a drop in the Indian hare population would have the following effects:

1. The fox population might decrease. Since foxes prey on hares, a major food source would become scarce, potentially leading to starvation or increased competition for other prey.
2. The grass and plant population might increase. With fewer hares to eat them, the plants would be able to grow more abundantly.
3. The deer and eagle populations might be indirectly affected. Foxes might start preying more on other animals, and eagles might face more competition from foxes, creating a ripple effect across the food web.

MULTIPLE CHOICE QUESTION

NODIA

10. What is a habitat?
(A) A place where an organism lives, providing all it needs for survival.
(B) The specific weather conditions found in an area.
(C) A large group of animals of the very same kind.
(D) Only the non-living parts that make up an environment.

Ans :

(A) A place where an organism lives, providing all it needs for survival.
A habitat is the natural home or environment of an organism. It provides all the essential resources, both living and non-living, that the organism needs to live, grow, and reproduce successfully.

11. In a pond ecosystem, which of the following is an example of an abiotic component?
(A) Fish
(B) Water
(C) Algae
(D) Frogs

Ans :

(B) Water
Abiotic components are the non-living chemical and physical parts of the environment that affect living organisms. Water, sunlight, soil, and temperature are all examples of abiotic factors, whereas fish, algae, and frogs are living, or biotic, components.

The biosphere is the global ecological system that integrates all living beings and their relationships. It encompasses all the parts of the Earth land, water, and air where life exists.

35. Which of the following statements about the Sundarbans is INCORRECT?
(A) They have the largest and most extensive mangrove forests in the world.
(B) They are a human-made ecosystem with no endangered species living there.
(C) They are located on the border between the countries of India and Bangladesh.
(D) They protect many coastal areas from dangerous storms and large floods.

Ans :

(B) They are a human-made ecosystem with no endangered species living there.
The Sundarbans are a natural ecosystem, not human-made. They are a crucial habitat for a wide variety of flora and fauna, including many endangered species like the Bengal tiger.

36. When elephants enter human farms in search of food, it is often a sign that _____.
(A) Elephants simply prefer the taste of farm crops to forest vegetation.
(B) The farmers are intentionally trying to attract the elephants to their farms.
(C) Their natural habitat is shrinking or is unable to support them.
(D) The total elephant population has become too large for the planet.

Ans :

(C) Their natural habitat is shrinking or is unable to support them.
Human-wildlife conflict often arises when an animal's natural habitat is degraded or fragmented. Deforestation and changes in vegetation can lead to a scarcity of food and water, forcing animals like elephants to venture into human-populated areas.

37. The relationship between an orchid growing on a tree, where the orchid benefits and the tree is unaffected, is called _____.
(A) Mutualism
(B) Parasitism
(C) Competition
(D) Commensalism

Ans :

(D) Commensalism
Commensalism is a relationship where one organism benefits and the other is neither helped nor harmed. The orchid gets a place to grow with access to sunlight, while the tree is not significantly affected by its presence.

38. Biotic is to living as abiotic is to _____.
(A) Non-living
(B) Breathing
(C) Growing
(D) Animal

Ans :

(A) Non-living
This analogy defines two fundamental ecological terms. Biotic components are all the living or once-living parts of an ecosystem. Abiotic components are all the non-living physical and chemical factors.

39. A farmer notices an increase in pests after using a broad-spectrum pesticide for several seasons. A possible ecological reason is that the pesticide _____.
(A) Also killed the natural predators of the pests
(B) Made the pests stronger
(C) Acted as a fertilizer for the pests
(D) Changed the weather patterns

Ans :

(A) Also killed the natural predators of the pests
Broad-spectrum pesticides are non-selective and can kill beneficial insects, such as ladybugs or spiders, that naturally prey on pests. The removal of these natural predators can lead to a resurgence or even an increase in the pest population over time.

40. In a grassland ecosystem, both hares and deer feed on grass. What is the relationship between the hares and the deer?
(A) Predator-prey
(B) Mutualism
(C) Competition
(D) Parasitism

Ans :

(C) Competition
Competition occurs when two or more organisms require the same limited resource. Since both hares and deer depend on grass for food, they are in competition with each other for this resource within their shared habitat.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

(A) A food chain is one linear path; a food web is many interconnected chains.
A food chain shows a simple one-way flow of energy. In reality, most organisms eat multiple things and are eaten by multiple things. A food web is a more realistic model that shows these complex, interconnected feeding relationships.

19. Which of the following is an INCORRECT statement about producers in an ecosystem?
(A) They are also known as autotrophs.
(B) They depend on other organisms for food.
(C) They form the first trophic level in a food chain.
(D) Green plants are an example of producers.

Ans :

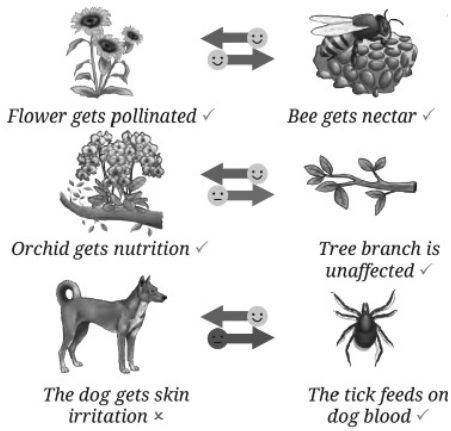
(B) They depend on other organisms for food.
The defining characteristic of a producer is its ability to make its own food, typically through photosynthesis. They do not depend on other organisms for their energy and nutrition; rather, they are the source of energy for consumers.

20. An animal that eats only plants, like a deer or a rabbit, is classified as a(n) _____.
(A) Carnivore (B) Omnivore
(C) Herbivore (D) Producer

Ans :

(C) Herbivore
Herbivores are primary consumers in an ecosystem. Their diet consists exclusively of plants and other producers. They occupy the second trophic level, obtaining energy by consuming plant matter.

21. In figure the relationship between a tick and a dog, where the tick benefits by feeding on blood and the dog is harmed, is an example of _____.


Flower gets pollinated ✓
Bee gets nectar ✓
Orchid gets nutrition ✓
Tree branch is unaffected ✓
The dog gets skin irritation ×
The tick feeds on dog blood ✓

Different types of interactions between organisms

(A) Mutualism
(B) Commensalism
(C) Competition
(D) Parasitism

Ans :

(D) Parasitism
Parasitism is a relationship where one organism (the parasite) lives on or in another organism (the host) and benefits by deriving nutrients at the host's expense. The tick benefits, while the dog is harmed through blood loss and potential disease transmission.

NODIA

22. If the population of deer in a forest suddenly decreases due to a disease, what will be the likely immediate impact on the tiger population?
(A) The tiger population will decrease due to a lack of food.
(B) The tiger population will increase due to more available space.
(C) The tiger population will not be affected by the deer at all.
(D) The tigers will be forced to start eating grass for survival.

Ans :

(A) The tiger population will decrease due to a lack of food.
In a simple food chain, populations are interdependent. Since tigers (predators) rely on deer (prey) as a primary food source, a significant decline in the deer population will lead to food scarcity for the tigers, likely causing their population to decrease as well.

23. In the study of the two ponds, Pond A (with fish) had more bees and butterflies, leading to more seed production in nearby plants. This shows that _____.
(A) Fish are the main and most important pollinators of flowers.
(B) The presence of one organism can indirectly affect others.
(C) Dragonflies are very helpful in helping plants produce seeds.
(D) Bees and butterflies prefer to live near ponds that contain fish.

Ans :

(B) The presence of one organism can indirectly affect others.
This illustrates a cascading effect. The fish controlled the dragonfly population. Fewer

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

dragonflies meant more pollinators (bees/ butterflies) survived. More pollinators led to better seed production. This shows the complex and sometimes indirect connections within an ecosystem.

24. The specific position an organism occupies in a food chain, such as a producer or primary consumer, is called its _____.
(A) Habitat
(B) Population
(C) Trophic level
(D) Niche

Ans :

(C) Trophic level
Trophic levels are the hierarchical levels in an ecosystem, comprising organisms that share the same function in the food chain. Producers are at the first level, herbivores at the second, and carnivores at subsequent levels.

25. The Green Revolution in India increased food production but is now considered unsustainable due to _____.
(A) The overuse of organic manure
(B) Growing too many different types of crops
(C) A lack of tractors and machinery
(D) The overuse of synthetic fertilisers and pesticides, and excessive groundwater extraction

Ans :

(D) The overuse of synthetic fertilisers and pesticides, and excessive groundwater extraction
While successful in boosting yields, the methods of the Green Revolution have led to long-term environmental problems. These include soil degradation from chemical overuse, depletion of water resources, and loss of biodiversity.

26. Producer is to autotroph as consumer is to _____.
(A) Heterotroph (B) Saprotroph
(C) Decomposer (D) Plant

Ans :

(A) Heterotroph
This analogy relates a common ecological term to its scientific equivalent. Producers make their own food and are called autotrophs (self-feeders). Consumers must obtain food by eating other organisms and are called heterotrophs (other-feeders).

27. Why is the ban on the export of frog legs from India considered an important ecological step?
(A) Because frogs are not a particularly valuable export item.
(B) To protect frogs, which in turn helps control agricultural pests.
(C) Because it forces and encourages farmers to use more pesticides.
(D) To increase the population of the many snakes that eat frogs.

Ans :

(B) To protect frogs, which in turn helps control agricultural pests.
Frogs play a vital role in their ecosystem as predators of insects. Over-harvesting them led to an increase in pest populations, forcing farmers to rely on chemical pesticides. The ban helps restore this natural balance and reduces environmental harm.

28. A forest, a grassland, and a desert are all examples of which type of ecosystem?
(A) Aquatic ecosystems
(B) Human-made ecosystems
(C) Terrestrial ecosystems
(D) Marine ecosystems

Ans :

(C) Terrestrial ecosystems
Ecosystems are broadly classified based on their environment. Terrestrial ecosystems are those that are found on land, such as forests, grasslands, and deserts, as opposed to aquatic ecosystems found in water.

29. What does 'geodiversity' refer to?
(A) The variety of landforms, rocks, and soils in an area.
(B) The variety of living organisms that can be found in an area.
(C) The different types of climates that are found on planet Earth.
(D) The genetic differences found within a single species.

Ans :

(A) The variety of landforms, rocks, and soils in an area.
Geodiversity encompasses the non-living parts of nature. It includes the variety of geological features (mountains, valleys), rocks, minerals, and soils, which together create the physical landscape and habitats for life.

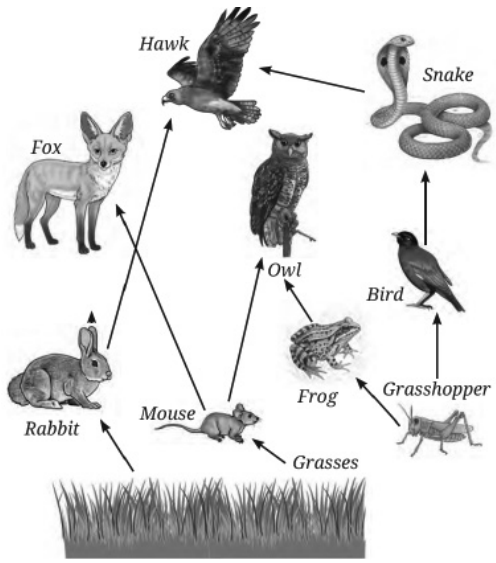
Click Here to Buy book on Amazon

30. An organism that eats only animals is a _____, while an organism that eats both plants and animals is an _____.
(A) Herbivore, omnivore
(B) Carnivore, herbivore
(C) Carnivore, omnivore
(D) Omnivore, carnivore

Ans :

(C) Carnivore, omnivore
These terms classify consumers based on their diet. Carnivores are meat-eaters, feeding exclusively on other animals. Omnivores have a more varied diet, consuming both plant matter and animals.

31. In the food web, which organism is an example of an omnivore?



Food web

(A) Fox
(B) Rabbit
(C) Snake
(D) Hawk

Ans :

(A) Fox
The foxes as omnivores, animals that eat both plant and animal matter. While the simplified diagram only shows the fox eating a rabbit, its classification as an omnivore is based on its varied diet in a real ecosystem.

32. If a farmer repeatedly grows the same crop (monoculture) and uses heavy pesticides, what is a likely long-term consequence for the farm's ecosystem?
(A) Increased soil fertility and a greater amount of biodiversity.
(B) Reduced soil fertility and a decrease in natural pest predators.
(C) The soil will become much more resistant to wind and water erosion.
(D) The total need for irrigation water on the farm will decrease.

Ans :

(B) Reduced soil fertility and a decrease in natural pest predators.
Monoculture and heavy pesticide use can degrade soil health by killing beneficial microorganisms and reducing organic matter. Pesticides also harm natural predators of pests, which can lead to an increased reliance on chemical controls and disrupt the local ecosystem's balance.

33. The process of pollination, shown infigure , is essential for what process in plants?

Insect pollination

(A) Photosynthesis
(B) Respiration
(C) Water absorption
(D) The formation of fruits and seeds

Ans :

(D) The formation of fruits and seeds
Pollination is the transfer of pollen (containing male gametes) to the female part of a flower. This is a crucial step in plant sexual reproduction, as it leads to fertilization and the subsequent development of seeds and fruits.

34. All living beings, along with the places where they live (land, water, air), make up the _____.
(A) Geosphere
(B) Atmosphere
(C) Hydrosphere
(D) Biosphere

Ans :

(D) Biosphere

Downloaded from www.pdf.tube

CHAPTER 12

HOW NATURE WORKS IN HARMONY

SUMMARY

1. HABITATS AND ECOSYSTEMS

1.1 Components of a Habitat

A habitat is the natural place or environment where an organism lives. It provides everything an organism needs to survive, such as food, water, and shelter.

Every habitat consists of two types of components:

1. Biotic Components : All the living or once-living parts of a habitat, such as plants, animals, and microorganisms.
2. Abiotic Components : The non-living physical and chemical parts of a habitat, such as sunlight, water, soil, air, and temperature.

1.2 From Habitat to Ecosystem

An ecosystem is a system formed by the interaction of the biotic community (all living things) with their abiotic environment in a particular area. Ecosystems can be terrestrial(like forests or grasslands) or aquatic(like ponds or rivers). They can be as large as an ocean or as small as a single tree.

2. LEVELS OF ORGANIZATION IN AN ECOSYSTEM

1. Population : A group of organisms of the same species living together in the same habitat. For example, all the fish of a single type in a pond make up a population.
2. Community : All the different populations of plants, animals, and microorganisms that live and interact with each other in the same habitat.

3. INTERACTIONS WITHIN ECOSYSTEMS

3.1 Feeding Relationships

Organisms in an ecosystem are classified by how they obtain food.

3.1.1 Producers, Consumers and Decomposers

1. Producers (Autotrophs):Organisms, mainly green plants, that produce their own food using sunlight through photosynthesis.
2. Consumers (Heterotrophs):Organisms that get energy by eating other organisms.
3. Herbivores : Eat only plants (e.g., deer, rabbits).
4. Carnivores : Eat only animals (e.g., tigers, snakes).
5. Omnivores : Eat both plants and animals (e.g., foxes, crows).
6. Decomposers (Saprotrophs) : Organisms like bacteria and fungi that break down dead plants and animals. This process, called decomposition, recycles essential nutrients back into the soil, making them available for producers.

3.1.2 Food Chains and Food Webs

1. Food Chain : A simple, linear sequence that shows how energy is transferred when one organism eats another (e.g., Grass →Grasshopper →Frog →Snake).
2. Trophic Level : The position an organism occupies in a food chain. Producers are at the first level, followed by consumers at higher levels.
3. Food Web : A more complex network of many interconnected food chains within an ecosystem, showing that most organisms have multiple food sources.

NODIA

Download INDIA's Best Study app NODIA

41. Why is the recycling of nutrients by decomposers so important for an ecosystem?
(A) It provides a direct and easily accessible food source for all carnivores.
(B) It increases the total amount of sunlight that reaches the ecosystem.
(C) It completely stops the natural flow of energy within the food web.
(D) It prevents the build-up of dead matter and recycles materials.

Ans :

(D) It prevents the build-up of dead matter and recycles materials.
Without decomposers, nutrients would remain locked up in dead organisms and waste. Decomposition releases these nutrients back into the soil and water, making them available for producers (plants) to absorb, thus sustaining the entire ecosystem.

42. An agricultural farm or a city park is an example of what type of ecosystem?
(A) A human-made ecosystem.
(B) A natural aquatic ecosystem.
(C) A natural terrestrial ecosystem.
(D) A balanced ecosystem that requires no care.

Ans :

(A) A human-made ecosystem.
While they contain living and non-living components, farms and parks are ecosystems that have been created and are actively managed by humans to meet specific needs, such as food production or recreation. They often lack the complexity and self-sustainability of natural ecosystems.

43. How do producers (autotrophs) get their energy compared to consumers (heterotrophs)?
(A) Producers eat consumers; consumers make their own food.
(B) Producers make their own food (usually from sunlight); consumers get energy by eating other organisms.
(C) Both get their energy from eating other organisms.
(D) Consumers make their own food; producers get energy by decomposition.

Ans :

(B) Producers make their own food (usually from sunlight); consumers get energy by eating other organisms.
This is the fundamental difference in energy acquisition. Producers are self-feeders, converting an external energy source like light into chemical energy. Consumers are other-feeders, obtaining their energy by ingesting the organic matter of other living things.

44. A population is a group of the same type of _____, while a community is made up of different _____.
(A) Ecosystems, habitats
(B) Organisms, populations
(C) Habitats, ecosystems
(D) Populations, organisms

Ans :

(B) Organisms, populations
This question tests the hierarchy of ecological organization. A population is defined as a group of individuals of the same species. A community is the next level up, comprising all the different populations that coexist in an area.

45. Which of the following is NOT a benefit provided by a healthy forest ecosystem?
(A) Providing fresh air by absorbing CO_2 and releasing O_2.
(B) Providing food, timber, and medicines.
(C) Helping to regulate climate and water cycles.
(D) Increasing the amount of synthetic pesticides in the soil.

Ans :

(D) Increasing the amount of synthetic pesticides in the soil.
Healthy ecosystems provide natural pest control services. Synthetic pesticides are human-made chemicals that can harm ecosystems. Their presence is a sign of environmental disruption, not a benefit provided by a healthy forest.

46. Migratory birds that travel from Siberia to India for the winter are linking two distinct _____.
(A) Ecosystems
(B) Populations
(C) Trophic levels
(D) Communities

Ans :

(A) Ecosystems
Migration is a powerful ecological link. By traveling between their breeding grounds (e.g., in Siberia) and their wintering grounds (e.g., in India), these birds connect two geographically

Click Here to Buy book on Amazon

separate ecosystems, playing roles as consumers and seed dispersers in both.

47. A major threat to the Sundarbans ecosystem is the cutting of mangrove trees for fuelwood and farming. This activity is a form of _____.
(A) Pollution (B) Deforestation
(C) Monoculture (D) Mutualism

Ans :

(B) Deforestation
Deforestation is the clearing of forests or stands of trees from land which is then converted to a non-forest use. The cutting down of mangrove trees in the Sundarbans is a direct example of this process, which destroys critical habitat.

48. What is the term for organisms that feed on dead organic matter?
(A) Autotrophs (B) Heterotrophs
(C) Saprotrophs (D) Carnivores

Ans :

(C) Saprotrophs
Saprotrophs are organisms, primarily fungi and bacteria, that get their nutrition from non-living organic matter. They are a key type of decomposer, essential for breaking down waste and recycling nutrients in an ecosystem.

49. A large banyan tree in a village provides shelter for birds, supports insects that feed on its leaves, and its fallen leaves enrich the soil. The tree and all the organisms that depend on it can be considered a small _____.
(A) Population (B) Community
(C) Abiotic factor (D) Ecosystem

Ans :

(D) Ecosystem
The banyan tree, along with all the living organisms (birds, insects, microbes) that interact with it and each other, and the non-living components (sunlight, air, soil beneath it), form a small, self-contained, and functional ecosystem.

50. Why does an ecosystem need a continuous supply of energy from an external source, like the sun?
(A) Because energy flows in one direction and is lost at each level.
(B) Because all of the energy is created by the decomposers.
(C) Because essential nutrients are lost and must be replaced by energy.
(D) Because all organisms are able to perform photosynthesis.

Ans :

(A) Because energy flows in one direction and is lost at each level.
Unlike nutrients which are recycled, energy flows through an ecosystem. It enters as sunlight, is captured by producers, and is transferred to consumers. At each transfer, a significant amount of energy is lost as heat, necessitating a constant input.

51. The relationship between two kinds of birds that compete for the same limited fruit on a tree is an example of _____.
(A) Parasitism
(B) Competition
(C) Mutualism
(D) Commensalism

Ans :

(B) Competition
Competition is an interaction between organisms in which both are harmed to some degree because they are vying for the same limited resources. In this case, both bird species are competing for the same food source.

52. Fish is to biotic as soil is to _____.
(A) Living (B) Habitat
(C) Abiotic (D) Ecosystem

Ans :

(C) Abiotic
This analogy classifies components of an ecosystem. A fish is a living, or biotic, component. Soil, being a non-living component (though it contains living things), is classified as an abiotic factor.

53. If a pesticide kills most of the insects in a field, what might happen to the population of insect-eating birds in that area?
(A) It will increase because there are no insects to bother them.
(B) It will not be affected at all.
(C) The birds will start eating the crops instead.
(D) It will decrease due to a lack of food.

Ans :

(D) It will decrease due to a lack of food.
This demonstrates the interconnected ness of a food web. The removal of a primary food source (insects) will lead to starvation and a decline in the population of the organisms that depend on it (the birds).

NODIA

54. In a pond ecosystem, fish obtain their abiotic need for oxygen from _____.
(A) The oxygen dissolved in the water
(B) The air above the pond
(C) The plants in the pond
(D) The soil at the bottom of the pond

Ans :

(A) The oxygen dissolved in the water
Fish do not breathe air directly. They use their gills to extract dissolved oxygen, an abiotic component, from the water. This dissolved oxygen comes from the atmosphere and from photosynthesis by aquatic plants.

55. Which statement about interactions in an ecosystem is INCORRECT?
(A) Plants interact with sunlight, water, and soil.
(B) Abiotic factors like sunlight and temperature do not interact with each other.
(C) Animals interact with plants and other animals for food.
(D) Decomposers interact with dead plants and animals.

Ans :

(B) Abiotic factors like sunlight and temperature do not interact with each other.
Abiotic factors absolutely interact. For example, sunlight (an abiotic factor) heats the water and soil (other abiotic factors), influencing the temperature. This interaction is fundamental to the physical conditions of the habitat.

56. What is the primary reason that protected areas like national parks and wildlife sanctuaries are established?
(A) To provide large and beautiful recreational spaces for humans.
(B) To create large and designated areas for sustainable farming.
(C) To conserve wildlife, their habitats, and overall biodiversity.
(D) To study the long-term effects of pollution on natural areas.

Ans :

(C) To conserve wildlife, their habitats, and overall biodiversity.
The main purpose of creating protected areas is conservation. They are designated spaces where natural ecosystems and the species within them are protected from human activities like hunting, logging, and development to preserve biodiversity.

57. The first trophic level in any food chain is always occupied by _____.
(A) Herbivores
(B) Carnivores
(C) Decomposers
(D) Producers

Ans :

(D) Producers
The flow of energy in an ecosystem begins with the producers. These organisms (like plants) create the initial organic matter from an external energy source (sunlight), forming the foundational first trophic level.

Download INDIA's Best Study app NODIA

58. A farmer uses Kunapa Jala, a liquid fertilizer made from fermented animal and plant waste, as advocated in the ancient text Vrikshayurveda. This is an example of what type of farming practice?
(A) Organic and sustainable farming
(B) Monoculture
(C) Synthetic chemical farming
(D) The Green Revolution

Ans :

(A) Organic and sustainable farming
This practice involves using natural, organic materials and biological processes (fermentation) to create fertilizer. It is a sustainable method that nourishes the soil without relying on synthetic chemicals, which is a core principle of organic farming.

59. How do biotic and abiotic components differ?
(A) Biotic components are large in size, and abiotic components are small.
(B) Biotic components are living parts; abiotic components are non-living.
(C) Biotic components are found on land; abiotic are found in water.
(D) There is no actual difference between biotic and abiotic components.

Ans :

(B) Biotic components are living parts; abiotic components are non-living.
This is the fundamental distinction used in ecology. Biotic refers to all life forms, including plants, animals, and microorganisms. Abiotic refers to all the non-living physical and chemical factors like sunlight, temperature, water, and soil.

Downloaded from www.pdf.tube

False
Abiotic components also depend on biotic ones; for example, plants release oxygen into the air, and their roots hold soil to prevent erosion.

99. The overuse of synthetic fertilizers and pesticides can lead to the degradation of soil health.

Ans :

True
Many scientists believe that overusing pesticides and repeatedly growing the same crop can lead to soil degradation.

VERY SHORT QUESTIONS

100. What is a habitat for an organism?

Ans :

A habitat is simply the specific place where an organism lives. It provides all the necessary conditions for the organism to survive and grow.

101. Why do animals move into human habitats from forests?

Ans :

When forests cannot support wildlife due to shrinking size or scarce resources, animals tend to move into human habitats in search of food and water.

102. What are the biotic components of a habitat?

Ans :

The biotic components of a habitat are all the living beings found within it. This includes all plants, animals, and microorganisms living together.

103. How do wildlife corridors help animals like elephants?

Ans :

Wildlife corridors connect different forest habitats, allowing animals like elephants to travel safely between large forest areas without conflicting with human settlements.

104. What are the abiotic components of a habitat?

Ans :

The abiotic components of a habitat consist of all the non-living things. These include elements like air, sunlight, water, temperature, and soil.

105. How can organisms in the same habitat avoid competition?

Ans :

Organisms in the same habitat can coexist by using resources in different ways or being active at different times, thus facing different conditions.

106. What is a population in a biological community?

Ans :

A population is a group of the same type or kind of organisms that live together in a particular habitat at a given time.

107. What would happen if a habitat had only one type of organism?

Ans :

If all organisms were the same, they would all have identical requirements, leading to intense competition and a possible scarcity of essential resources.

108. What is a community in a habitat?

Ans :

A community comprises all the different populations of plants, animals, and microorganisms that share the same habitat and interact with one another.

109. Why might a pond with fish have more flowering plants nearby?

Ans :

Fish eat dragonfly larvae, reducing dragonflies that eat pollinators like bees. More pollinators lead to better seed production in nearby flowering plants.

110. Define pollination.

Ans :

Pollination is the process where pollen is carried from the male part (stamen) to the female part (carpel) of flowers, which is essential for forming fruits and seeds.

111. How do fish indirectly affect plant seed production?

Ans :

By controlling the population of dragonfly larvae, fish indirectly increase the number of pollinators,

NODIA

Population, community, and ecosystem are hierarchical levels of organization describing how living things are structured. A trophic level is not a level of organization but rather a functional position within a food chain (e.g., producer, consumer).

66. If you want to study a 'community' in a forest, what would you be observing?
(A) The different populations of all species interacting with each other.
(B) Only the single population of deer that lives in the forest.
(C) The average temperature and the seasonal rainfall patterns.
(D) The specific chemical composition of the rocks and the soil.

Ans :

(A) The different populations of all species interacting with each other.
A community includes all the living (biotic) populations within a habitat. Therefore, studying a forest community would involve observing the interactions between all the different species of plants, animals, and other organisms living there.

67. The decline of frog populations in India led to a rise in agricultural pests. This is because frogs play the role of _____ in the farm ecosystem.
(A) Producers
(B) Predators
(C) Decomposers
(D) Herbivores

Ans :

(B) Predators
Frogs are carnivores that consume a large number of insects. In this context, they act as natural predators, helping to control the population of agricultural pests. Their decline removed this natural control mechanism.

68. Soil is to geosphere as water is to _____.
(A) Atmosphere (B) Biosphere
(C) Hydrosphere (D) Lithosphere

Ans :

(C) Hydrosphere
This analogy relates a substance to the Earth system sphere it belongs to. Soil is a component of the geosphere (the solid Earth). Water is the primary component of the hydrosphere (all water on Earth).

69. Why is biodiversity (the variety of different species) considered important for the health of an ecosystem?
(A) It makes the entire ecosystem look much more beautiful.
(B) It increases competition, which weakens all the species.
(C) It has no real impact on the ecosystem's overall function.
(D) Diverse ecosystems are generally more stable and resilient.

Ans :

(D) Diverse ecosystems are generally more stable and resilient.
Higher biodiversity often leads to a more complex food web and more redundant roles within the ecosystem. This complexity can make the ecosystem more stable, as the loss of one species might be compensated for by another, making it more resilient to disturbances.

70. Which of the following is a human-made ecosystem?
(A) A fish pond
(B) A river
(C) A desert
(D) A mountain range

Ans :

(A) A fish pond
A fish pond is an artificial ecosystem created and managed by humans, often for the purpose of aquaculture. Unlike a natural lake or river, its components and conditions are controlled by human intervention.

71. How does a carnivore differ from an omnivore?
(A) Carnivores eat plants; omnivores eat animals.
(B) Carnivores eat only animals; omnivores eat both plants and animals.
(C) Carnivores are producers; omnivores are consumers.
(D) There is no difference; both eat meat.

Ans :

(B) Carnivores eat only animals; omnivores eat both plants and animals.
Both are types of consumers. The distinction is in the breadth of their diet. Carnivores are specialized to eat only other animals (meat), whereas omnivores have a more generalized diet that includes both plant material and animal flesh.

Click Here to Buy book on Amazon

Options
(a) 1-D, 2-A, 3-C, 4-B
(b) 1-C, 2-D, 3-B, 4-A
(c) 1-B, 2-C, 3-A, 4-D
(d) 1-A, 2-B, 3-D, 4-C

Ans :

(b) 1-C, 2-D, 3-B, 4-A
The biotic components of an ecosystem are the living parts, while the abiotic components are the non-living parts. A food chain is a simple feeding sequence, and a food web is a complex network of these chains.

83. Match the type of interaction between two organisms with its correct description.

	Column A		Column B
1	Mutualism	A	A relationship where one organism benefits and the other is harmed, such as a tick on a dog.
2	Commensalism	B	An interaction where both organisms benefit from each other, like a bee and a flower.
3	Parasitism	C	An interaction where organisms struggle for the same limited resources like food, water, or space.
4	Competition	D	A relationship where one organism benefits, and the other is unaffected, like an orchid growing on a tree.

Options
(a) 1-A, 2-C, 3-D, 4-B
(b) 1-B, 2-D, 3-A, 4-C
(c) 1-D, 2-A, 3-C, 4-B
(d) 1-C, 2-B, 3-D, 4-A

Ans :

(b) 1-B, 2-D, 3-A, 4-C
Mutualism is when both organisms benefit. Commensalism is when one benefits and the other is unaffected. Parasitism is when one benefits by harming the other. Competition occurs when organisms need the same limited resources.

Download INDIA's Best Study app NODIA

84. Match the ecological concept with its real-world example or implication.

	Column A		Column B
1	Ecosystem Balance	A	A process essential for plant reproduction, often carried out by bees and butterflies.
2	Pollination	B	Practices like overuse of pesticides that can lead to soil degradation.
3	Protected Area	C	A stable state where interactions keep populations and resources steady.
4	Unsustainable Farming	D	A designated space, like a national park, to conserve wildlife and habitats.

Options
(a) 1-C, 2-A, 3-D, 4-B
(b) 1-B, 2-D, 3-A, 4-C
(c) 1-D, 2-B, 3-C, 4-A
(d) 1-A, 2-C, 3-B, 4-D

Ans :

(a) 1-C, 2-A, 3-D, 4-B
Ecosystem balance refers to the stability of populations and resources. Pollination is a key process for plant reproduction. A protected area is a conservation space for wildlife. Unsustainable farming practices can damage the environment.

NODIA

TRUE AND FALSE

85. The living organisms in a habitat, such as plants and animals, are known as its abiotic components.

Ans :

False
The living beings in a habitat are termed biotic components. The non-living things, like soil and water, are the abiotic components.

86. An ecosystem is formed by the interaction between the living (biotic) and non-living (abiotic) components in an area.

Ans :

True

79. Why is it important to protect ecosystems like the Sundarbans?

(A) Only because they are home to endangered animals like tigers.

(B) Because they provide essential services like coastal protection.

(C) Because they can be converted into farmland to feed more people.

(D) Only because they are a major and popular tourist attraction.

Ans :

(B) Because they provide essential services like coastal protection.

Protecting ecosystems is crucial not just for wildlife, but for human well-being. The Sundarbans mangrove forest acts as a natural barrier against storms, absorbs carbon dioxide, and is a vital habitat for countless species, highlighting the multiple essential benefits ecosystems provide.

MATCHING TYPE QUESTIONS

80. Match the level of ecological organization with its correct definition.

	Column A		Column B
1	Population	A	All the different groups of organisms living and interacting in the same area.
2	Community	B	A group of organisms of the same kind living together in a specific habitat.
3	Ecosystem	C	The specific place where an organism lives, which provides for its needs.
4	Habitat	D	The interaction between all the living things and the non-living things in an area.

Options

(a) 1-D, 2-C, 3-A, 4-B

(b) 1-C, 2-D, 3-B, 4-A

(c) 1-B, 2-A, 3-D, 4-C

(d) 1-A, 2-B, 3-C, 4-D

Ans :

(c) 1-B, 2-A, 3-D, 4-C

A population is a group of the same species. A community includes all the different populations in an area. An ecosystem includes the community plus the non-living environment. A habitat is the specific home of an organism.

81. Match the organism with its correct role in the ecosystem's food chain.

	Column A		Column B
1	Producer	A	An animal that feeds only on other animals, such as a leopard.
2	Herbivore	B	An organism, like fungi or bacteria, that breaks down dead organic matter.
3	Carnivore	C	An organism, like a green plant, that makes its own food through photosynthesis.
4	Decomposer	D	An animal that feeds only on plants, such as a deer.

Options

(a) 1-C, 2-D, 3-A, 4-B

(b) 1-D, 2-C, 3-B, 4-A

(c) 1-A, 2-B, 3-C, 4-D

(d) 1-B, 2-A, 3-D, 4-C

Ans :

(a) 1-C, 2-D, 3-A, 4-B

A producer makes its own food. A herbivore eats plants, while a carnivore eats animals. A decomposer recycles nutrients by breaking down dead material.

82. Match the ecological term with its correct definition.

	Column A		Column B
1	Biotic Component	A	A network of interconnected feeding relationships.
2	Abiotic Component	B	A simple sequence showing 'who eats whom'.
3	Food Chain	C	The living organisms in a habitat.
4	Food Web	D	The non-living physical and chemical factors of a habitat.

NODIA

72. Which of the following is an INCORRECT example of an interaction between biotic and abiotic components?
(A) A plant absorbing sunlight for photosynthesis.
(B) A fish using dissolved oxygen from the water.
(C) A bird eating a worm.
(D) An earthworm living in moist soil.

Ans :

(C) A bird eating a worm.
A bird eating a worm is an interaction between two living organisms (two biotic components), specifically a predator-prey relationship. The other options all describe an interaction between a living thing and a non-living part of its environment.

73. All the different populations living and interacting in the same habitat form a(n) _____.
(A) Ecosystem (B) Population
(C) Biosphere (D) Community

Ans :

(D) Community
The term 'community' in ecology specifically refers to the collection of all living organisms of different species that inhabit and interact within a particular area. It represents the biotic part of an ecosystem.

74. The ancient practice of using organic manure like Kunapa Jala instead of synthetic chemicals supports which modern farming concept?
(A) Sustainable agriculture
(B) The Green Revolution
(C) Monoculture
(D) Deforestation

Ans :

(A) Sustainable agriculture
Using fermented organic waste as fertilizer is a practice that enriches the soil naturally and recycles nutrients. This aligns with the principles of sustainable agriculture, which aims to farm in a way that is environmentally sound and maintains soil health for the long term.

75. The 'cascading effect' described when plants in a pond die from pollution means that _____.
(A) The pond becomes deeper
(B) One initial change leads to a series of other changes in the ecosystem
(C) All the animals in the pond turn into plants
(D) The water temperature rises suddenly

Ans :

(B) One initial change leads to a series of other changes in the ecosystem
A cascading effect describes a chain reaction within an ecosystem. The initial death of plants leads to less oxygen, which causes fish to die, which leads to more insects, and so on. Each change triggers the next in a sequence.

76. An orchid grows high on the branch of a tall tree in a dense forest. The orchid benefits from getting more sunlight, but the tree is not harmed or helped. This relationship is _____.
(A) Mutualism
(B) Commensalism
(C) Parasitism
(D) Competition

Ans :

(B) Commensalism
This is a classic example of commensalism. One species (the orchid) benefits significantly from the relationship, while the other species (the tree) is essentially unaffected, neither gaining a benefit nor suffering any harm.

77. Which of the following is NOT a part of the biotic community of a forest?
(A) Trees and shrubs
(B) Deer and tigers
(C) Fungi and bacteria
(D) Soil and rocks

Ans :

(D) Soil and rocks
Soil and rocks are abiotic, or non-living, components of the forest ecosystem. The biotic community consists of all the living organisms, which includes the plants, animals, and microorganisms like fungi and bacteria.

78. The feeding relationship where an organism benefits and its host is harmed is known as _____.
(A) Parasitism
(B) Commensalism
(C) Mutualism
(D) Predation

Ans :

(A) Parasitism
In a parasitic relationship, the parasite lives on or inside the host, deriving nourishment at the host's expense. This interaction is beneficial for the parasite but detrimental to the host.

Downloaded from www.pdf.tube

The biotic components and the abiotic components in a habitat interact with each other to form an ecosystem.

87. A food web is a simple, linear sequence that shows one organism eating another.

Ans :

False
A simple linear sequence showing 'who eats whom' is a food chain. A food web is a network of many interlinked food chains.

88. Organisms like plants that can produce their own food are called consumers.

Ans :

False
Plants that make their own food are called producers or autotrophs. Organisms that depend on others for food are called consumers.

Download INDIA's Best Study app NODIA

89. Decomposers, like fungi and bacteria, are essential for recycling nutrients back into the ecosystem.

Ans :

True
Decomposers break down dead plants and animals into simpler substances, a process which returns important nutrients to the soil.

90. A community is made up of a group of the same type of organisms living together.

Ans :

False
A group of the same type of organisms is a population. A community is made up of different populations sharing the same habitat.

91. In a parasitic relationship, such as a tick on a dog, both organisms benefit equally.

Ans :

False
In parasitism, one organism benefits while the other is harmed. An interaction where both organisms benefit is called mutualism.

92. Human activities like deforestation and pollution have the potential to disrupt the natural balance of ecosystems.

Ans :

True
An ecosystem's balance can be disrupted by human-made changes like cutting down trees for construction or pollution from industrial waste.

93. Herbivores are organisms that feed on both plants and animals.

Ans :

False
Organisms that eat only plants are called herbivores. Organisms that eat both plants and animals are known as omnivores.

94. Ecosystems can only be large, like a forest or an ocean.

Ans :

False Ecosystems can be large or small. For instance, a pond is an aquatic ecosystem, and a single large tree can be a terrestrial ecosystem.

95. The different positions that organisms occupy in a food chain are called trophic levels.

Ans :

True
Each organism in a food chain has a specific position, which is called a trophic level. Producers like plants are at the first trophic level.

96. Human-made ecosystems, like farms and parks, can sustain themselves without any human care or management.

NODIA

Ans :

False
Unlike natural ecosystems, these human-made ecosystems require human care and management to be maintained.

97. The relationship where one organism benefits while the other is not affected is known as commensalism.

Ans :

True
Commensalism is a relationship where one organism benefits and the other is unaffected, such as orchids growing on trees.

98. While living things depend on non-living things, the non-living parts of an ecosystem are not affected by living things.

Ans :

60. A large tree is cut down in a forest. This single action can affect the birds that nested in it, the insects that fed on it, and the amount of sunlight reaching the smaller plants below. This illustrates that _____.
(A) Only the animals are truly important in a forest ecosystem.
(B) Ecosystems are naturally resilient to all types of changes.
(C) Components in an ecosystem are highly interconnected.
(D) Trees do not interact with their surrounding environment.

Ans :

(C) Components in an ecosystem are highly interconnected.
This example shows the ripple effect of a single change. The removal of one key component (the tree) has direct and indirect consequences for many other living (birds, insects, other plants) and non-living (sunlight) parts of the ecosystem, highlighting their interdependence.

61. In which trophic level would you place a herbivore like a cow?
(A) First trophic level
(B) Third trophic level
(C) Fourth trophic level
(D) Second trophic level

Ans :

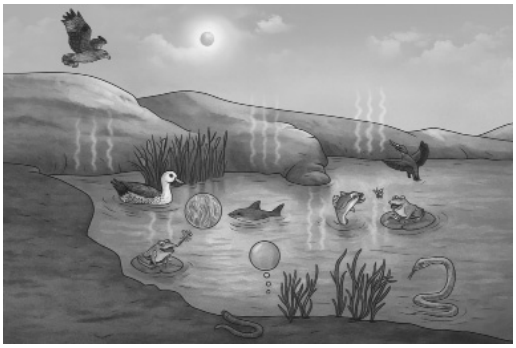
(D) Second trophic level
The first trophic level consists of producers (plants). Herbivores, which are primary consumers that feed on producers, occupy the second trophic level in the food chain.

62. An organism's habitat is its 'address', while its role in the ecosystem (e.g., being a producer or a predator of insects) is its 'profession'. This 'profession' is also known as its ecological _____.
(A) Niche
(B) Population
(C) Community
(D) Trophic level

Ans :

(A) Niche
An organism's niche describes its specific functional role within an ecosystem—what it eats, what eats it, how it interacts with abiotic factors, and its overall effect on the environment. It is more than just where it lives.

63. In Figure the hawk flying in the sky is a biotic component. Its interaction with the sunlight, which allows it to see its prey, is an example of an interaction between _____.



Biotic and abiotic interactions

(A) Two biotic components
(B) A biotic and an abiotic component
(C) Two abiotic components
(D) A producer and a consumer

Ans :

(B) A biotic and an abiotic component
The hawk is a living (biotic) organism. The sunlight is a non-living (abiotic) factor. The hawk's use of sunlight to hunt represents a direct interaction between a living component and a non-living component of the ecosystem.

64. A pond is an example of an _____ ecosystem, while a farm is an example of a _____ ecosystem.
(A) Terrestrial, aquatic
(B) Natural, artificial
(C) Aquatic, human-made
(D) Balanced, unbalanced

Ans :

(C) Aquatic, human-made
A pond is a body of water, making it an aquatic ecosystem. A farm is an area of land and crops cultivated and managed by humans, classifying it as a human-made or artificial ecosystem.

65. Which of the following is NOT a level of ecological organization?
(A) Population
(B) Community
(C) Ecosystem
(D) Trophic Level

Ans :

(D) Trophic Level

Click Here to Buy book on Amazon

which in turn helps nearby plants produce more seeds.

112. What are the two main types of ecosystems in nature?

Ans :

The two main types of ecosystems are aquatic ecosystems, which include ponds and rivers, and terrestrial ecosystems, which include forests and farms.

113. How do plants depend on abiotic components for survival?

Ans :

Plants depend on abiotic components like sunlight, carbon dioxide, and water for making food through photosynthesis, and on soil for essential nutrients.

114. What are producers or autotrophs in an ecosystem?

Ans :

Producers, or autotrophs, are organisms like plants that can make their own food, typically through the process of photosynthesis using sunlight.

115. Differentiate between herbivores and carnivores with one example each.

Ans :

Herbivores are organisms that eat only plants, such as deer. In contrast, carnivores are organisms that eat only animals, such as leopards.

116. What are consumers or heterotrophs in an ecosystem?

Ans :

Consumers, or heterotrophs, are organisms that cannot produce their own food. They depend on other organisms, like plants or animals, for their nutrition.

117. Why are decomposers also called saprotrophs?

Ans :

Decomposers are called saprotrophs because they feed on rotten or dead organic matter. The term comes from 'sapro' (rotten) and 'trophs' (food).

118. What are omnivores? Give an example.

Ans :

Omnivores are organisms that consume both plants and animals for their nutrition. An example of an omnivore is a fox.

119. Explain why a food chain represents a linear feeding relationship.

Ans :

A food chain is a simple, linear sequence because it shows a direct path of energy transfer, representing "who eats whom" in a straight line.

120. What is a food chain in an ecosystem?

Ans :

A food chain is a simple sequence that illustrates the feeding relationship among organisms, showing 'who eats whom' to transfer energy within an ecosystem.

Download INDIA's Best Study app NODIA

121. How does a food web differ from a single food chain?

Ans :

A food web is more complex than a food chain because it consists of multiple interlinked food chains, showing that organisms can be eaten by various predators.

122. What are the trophic levels in a food chain?

Ans :

Trophic levels are the specific positions that different organisms occupy within a food chain based on their source of food, such as producers or consumers.

123. Why is nothing wasted in nature?

Ans :

In nature, nothing is wasted because decomposers break down dead organisms and waste products, recycling the nutrients back into the soil for reuse.

NODIA

124. What is the process of decomposition?

Ans :

Decomposition is the process where microorganisms like fungi and bacteria break down complex substances in dead plants and animals into simpler ones.

125. How do migratory birds help farmers?

Ans :

Migratory birds act as predators of insect pests, helping farmers to control pest populations. This indirectly contributes to healthy crop growth on farms.

126. What are decomposers? Give two examples.

Ans :

Decomposers are organisms that break down dead matter, returning nutrients to the environment. Examples include microorganisms like fungi and bacteria.

127. How can a decrease in pond plants lead to more crop pests?

Ans :

Fewer pond plants cause less oxygen, leading to fish death. With fewer fish to eat their larvae, insects increase and can become crop pests.

128. What is mutualism? Give one example.

Ans :

Mutualism is a type of interaction where both organisms involved receive benefits. An example is the relationship between honeybees and flowers.

129. Explain why the Indian government banned the export of frog legs.

Ans :

The government banned the export of frog legs to prevent further ecological damage that was caused by a rise in agricultural pests due to declining frog populations.

130. What is commensalism? Provide an example.

Ans :

Commensalism is an interaction where one organism benefits while the other is not affected. An example is an orchid getting nutrition while growing on a tree.

131. Why is competition between organisms important for an ecosystem?

Ans :

Competition for common resources like food, water, and space helps to control population sizes, keeping the entire ecosystem balanced and preventing overpopulation.

132. Define parasitism, giving one example.

Ans :

Parasitism is an interaction in which one organism benefits while the other is harmed. An example is ticks on the body of a dog.

133. How do mangrove forests like the Sundarbans protect coastal areas?

Ans :

Mangrove forests in the Sundarbans serve as a natural barrier. They protect coastal regions by slowing down strong winds and waves during storms and floods.

Download INDIA's Best Study app NODIA

134. What are some benefits humans get from forest ecosystems?

Ans :

Forest ecosystems provide humans with numerous benefits, including fresh air, fertile soil for agriculture, food, fibres, timber for construction, and medicinal plants.

135. Why are the Sundarbans considered a threatened ecosystem?

Ans :

The Sundarbans are threatened by human activities like cutting mangroves for fuelwood, illegal hunting, overuse of resources, and pollution from industrial waste.

136. What are human-made ecosystems? Give an example.

Ans :

Human-made ecosystems are artificial ecosystems that humans have created to meet their needs, such as fish ponds, agricultural farms, and parks.

137. How can monoculture farming affect pollinators and crop diversity?

Ans :

Monoculture, or growing the same crop repeatedly, can reduce overall crop diversity and negatively affect pollinators that are crucial for successful food production.

138. What was the Green Revolution in Indian farming?

Ans :

Downloaded from www.pdf.tube

The Green Revolution was a period in the mid-20th century characterized by the use of tractors, machines, and synthetic chemicals to help increase food production.

139. How does overuse of synthetic fertilizers harm soil fertility?

Ans :

Overuse of synthetic fertilizers can reduce soil fertility by decreasing the population of friendly microorganisms and lowering the organic matter (humus) content in the soil.

SHORT ANSWER QUESTIONS

140. What are the essential conditions that a habitat like a pond provides for the survival of organisms?

Ans :

A pond provides several conditions essential for the survival of its organisms. It offers a source of food from small plants and animals, dissolved oxygen from the water for respiration, and shelter among aquatic vegetation. It also provides adequate space for organisms like fish, frogs, and insects to grow, reproduce, and carry out their life cycles in a stable environment.

141. Why do changes in rainfall and temperature affect wildlife like elephants in their natural habitat?

Ans :

Changes in rainfall and temperature have a direct impact on wildlife like elephants for several reasons:

- These changes affect the growth and availability of vegetation, which is the primary food source for elephants.
- Drying water holes, due to less rainfall and higher temperatures, force elephants to wander in search of water.
- Such environmental shifts lead to shrinking and drying of forests, reducing the natural home available for them.

142. Explain what constitutes a community within a habitat, using examples of biotic components.

Ans :

A community is formed by the various different populations of living organisms that coexist and interact within the same habitat. It represents the entirety of the biotic components. For example, in a pond habitat, the community would include populations of fish, frogs, snails, dragonflies, and various plants like algae and lotus, all living together and depending on one another for survival.

143. How does the presence of fish in a pond create a chain of effects on dragonflies and pollinators?

Ans :

The presence of fish in a pond initiates a chain of effects that influences other organisms:

- Fish consume dragonfly larvae, which leads to a smaller adult dragonfly population in the area.
- Dragonflies are predators of pollinators like bees and butterflies.
- With fewer dragonflies, the populations of bees and butterflies can thrive, leading to increased pollination of nearby plants.

144. The table shows different types of interactions within a habitat. Based on the examples under "Interaction among the biotic components," explain how predation and competition help maintain balance in an ecosystem.

Interactions between Biotic and Abiotic Components	Interaction between Two Abiotic Components	Interaction among the Biotic Components
Earthworms live in moist soil.	The day temperature is high due to the bright sunlight.	A frog eats insects.
A fish lays eggs in water.	Water is evaporating fast due to the sunlight.	Frogs and fish may compete for small insect larvae.

Ans :

Predation, like a frog eating insects, controls the population of prey species, preventing them from becoming too numerous. Competition between frogs and fish for the same food source (larvae) also limits their population sizes, ensuring that resources are not completely depleted, thus maintaining balance.

NODIA

Healthy ecosystems provide numerous essential benefits, known as ecosystem services, that support human well-being.

- **Provisioning Services** : Forests provide us with tangible resources like food, fresh water, timber for construction, fibres, and a vast array of medicinal plants. Similarly, aquatic ecosystems are a major source of food (fish) and water.
- **Regulating Services** : Forests play a critical role in maintaining a healthy environment by purifying the air, regulating climate, and preventing soil erosion. Mangrove forests also protect coastal communities from storms.
- **Cultural Services** : Beyond material goods, ecosystems offer aesthetic beauty and recreational opportunities, which are important for our mental and physical health.

182. Explain the chain of events that links water pollution in a pond to damaged farm crops nearby.

Ans :

The connection between a polluted pond and damaged crops illustrates how interconnected ecosystems are.

- The process begins when pollution causes aquatic plants in the pond to die.
- The decay of these plants consumes oxygen, leading to less oxygen in the water, which in turn causes fish to die.
- Fish are natural predators of many insects. With the fish population gone, the number of insects and their larvae in and around the pond increases dramatically.
- This large insect population then spreads to nearby farmlands, where they become pests and cause significant damage to the crops, completing the destructive chain of events.

183. What role do protected areas play in conservation? Name some examples and explain their importance.

Ans :

Protected areas are designated regions of land or water set aside to conserve nature and are fundamental to protecting biodiversity.

- **Primary Role** : Their main purpose is to conserve wildlife and their natural habitats from human threats like deforestation, pollution, and over-exploitation. They help protect entire ecosystems, not just individual species.
- **Importance** : They are crucial for safeguarding endangered animals, birds, and rare plants that might otherwise go extinct. By preserving these areas, we ensure the survival of nature for future generations.
- **Examples** : India has many such areas, including Jim Corbett National Park, Nilgiri Biosphere Reserve, and Chilika Lake, each protecting a unique habitat.

184. How can the principles of ecosystem interactions be applied to develop more sustainable farming practices?

Ans :

Understanding ecosystem interactions can help create farming methods that are more sustainable and less harmful to the environment.

- **Promoting Natural Pest Control** : By creating habitats for natural predators like birds and beneficial insects, farmers can reduce their reliance on synthetic pesticides, as these predators will help control pest populations.
- **Enhancing Soil Health** : Instead of using synthetic fertilizers, farmers can use organic manure and composting, which nourishes the soil by supporting decomposers and microorganisms, thereby improving fertility naturally.
- **Increasing Biodiversity** : Moving away from monoculture and planting diverse crops can attract more pollinators, improve soil health, and make the farm ecosystem more resilient to disease and pests.

CASE BASED QUESTIONS

185. In several Indian states, deforestation and drying waterholes force elephants into farms in search of food like sugarcane, leading to crop damage and conflict. To solve this, wildlife ecologists have marked corridors connecting forest habitats. These safe passages allow elephants to travel between large forest areas without entering human settlements, showing how human planning can reduce this conflict.

Questions:

1. What are the non-living (abiotic) factors that force elephants to leave their natural habitat?
2. What is the purpose of an elephant corridor?

Click Here to Buy book on Amazon

Organism 1	Organism 2	Outcome
Flower gets pollinated (✓)	Bee gets nectar (✓)	Mutualism
Orchid gets nutrition (✓)	Tree branch is unaffected	Commensalism
The dog gets skin irritation (×)	The tick feeds on dog blood (✓)	Parasitism

Ans :

The flower and bee show mutualism as both benefit. The orchid and tree show commensalism because one benefits while the other is unaffected. The dog and tick show parasitism, where the tick benefits at the expense of the dog, which is harmed.

152. Why are protected areas like national parks and wildlife sanctuaries crucial for conservation?

Ans :

Protected areas are vital for conservation efforts due to several key roles they play:

- They are specifically set aside to conserve wildlife and their natural habitats.
- These areas help protect entire ecosystems, including endangered animals, birds, and many species of rare plants.
- By preserving these habitats, they play a significant role in saving nature for the benefit of future generations.

153. Explain the process of decomposition and the important role that decomposers play in recycling nutrients.

Ans :

Decomposition is the natural process where organisms called decomposers, such as fungi and bacteria, break down complex substances found in dead plants, animals, and waste products into simpler ones. This process is crucial because it returns important nutrients back into the soil, making them available for plants to use for growth. Thus, decomposers play a vital role in recycling essential materials within an ecosystem.

154. Analyze the consequences of the large-scale harvesting of Indian bullfrogs in the 1980s.

Ans :

The large-scale harvesting of Indian bullfrogs had significant ecological consequences:

- It led to a sharp decline in the frog populations, disrupting the natural balance.
- Since frogs are natural predators of insects, their reduced numbers caused a rise in agricultural pests.
- This forced farmers to increase their use of synthetic pesticides, which in turn harmed the environment, soil, and water quality.

155. What are the various types of interactions that can occur among the biotic components of a habitat?

Ans :

Organisms within a habitat interact in several ways beyond just feeding. They often compete for common and limited resources such as food, water, physical space, or sunlight. Other key interactions include mutualism, where both species benefit; commensalism, where one benefits and the other is unaffected; and parasitism, where one benefits at the expense of the other, which is harmed.

156. Explain how competition helps to maintain a balance in an ecosystem's population sizes and resources.

Ans :

Competition plays a crucial role in maintaining ecological balance through the following mechanisms:

- Organisms compete for limited resources like food, water, and shelter.
- This competition naturally helps control the population size of different species, preventing any single species from multiplying excessively.
- By regulating populations, competition ensures that resources are not depleted, thus keeping the ecosystem stable and balanced.

157. The table lists the components of two different habitats. Explain why a fish, a biotic component, can survive in the pond habitat but not in the forest habitat, by linking it to the specific abiotic components.

Pond	Forest
Living beings : Fish, Plants, Grass	Living beings : Trees, Birds
Non-living things : Water, Soil	Non-living things : Soil

Ans :

Downloaded from www.pdf.tube

- By emphasizing natural inputs, it promotes a farming system that is in harmony with the ecosystem, a core goal of sustainability.

171. What specific threats are endangering the mangrove forests and wildlife in the Sundarbans?

Ans :

The Sundarbans ecosystem is facing multiple severe threats due to human activities. Mangrove trees, crucial to the ecosystem, are being cut down for fuelwood and to clear land for farming. The wildlife is threatened by illegal hunting and the general overuse of forest resources. Furthermore, pollution from industrial waste and untreated sewage flowing into the rivers is damaging the water quality and the overall habitat for its diverse flora and fauna.

172. How can growing the same crop repeatedly (monoculture) lead to soil degradation and affect pollinators?

Ans :

The practice of monoculture can have severe negative impacts on the farm ecosystem:

- It reduces crop diversity, which can limit food sources for essential pollinators like bees, negatively affecting their populations.
- Continuously growing one crop depletes specific nutrients from the soil, leading to soil degradation and reduced fertility over time.
- This lack of diversity can also make the entire crop more vulnerable to specific pests and diseases.

173. What are some examples of biotic interactions that influence the availability of resources for life processes?

Ans :

Biotic interactions directly influence resource availability. For instance, in a pond, frogs and fish may compete for the same food source, such as small insect larvae, which affects how much food is available for each. In another interaction, a fish may lay its eggs near aquatic vegetation. This interaction with plants provides protection for the eggs from being eaten by other predators like frogs, thus influencing the reproductive success of the fish.

174. How do the roots of plants demonstrate an interaction between biotic and abiotic components?

Ans :

The roots of plants show a clear interaction between biotic and abiotic factors:

- Plant roots (a biotic component) grow into the soil (an abiotic component), anchoring the plant and absorbing water and nutrients.
- In return, the network of roots holds the soil particles together, preventing soil erosion, which is an effect of a biotic component on an abiotic one.
- The roots also help the soil retain moisture, demonstrating another way living things influence their non-living environment.

NODIA

LONG ANSWER QUESTIONS

175. Describe the structure of an ecosystem, starting from an individual organism up to the entire ecosystem.

Ans :

The structure of an ecosystem is organized in hierarchical levels, each building upon the last.

- The most basic level is the **individual organism**, a single living being.
- A group of individuals of the same kind living in the same area forms a **population**. For instance, all the fish of a particular species in a pond make up a population.
- Multiple different populations (e.g., fish, frogs, plants) sharing the same habitat and interacting with each other form a **community**.
- Finally, the **ecosystem** is formed when this community of living organisms interacts with all the non-living, abiotic components like water, soil, and sunlight in that area.

176. Analyze how a single human intervention, like the over-harvesting of frogs, can disrupt an entire ecosystem.

Ans :

A single human intervention like the over-harvesting of frogs can trigger a chain reaction with widespread consequences for an ecosystem.

- First, the large-scale removal of frogs leads to a significant decline in their population.
- Since frogs are primary consumers of insects, their absence causes a surge in the population of agricultural pests, which can damage crops.

	Pond A	**Pond B**
Fish	Present	Absent
Dragonflies	Few	Many
Bees/Butterflies	Many	Few
Seed Production in Nearby Plants	High	Low

Ans :

The presence of fish (Pond A) leads to fewer dragonflies, as fish eat their larvae. With fewer dragonfly predators, the population of pollinators like bees and butterflies increases. This results in more effective pollination and higher seed production in nearby plants.

165. What is parasitism? Explain this relationship using the example of ticks and dogs.

Ans :

Parasitism is an interaction between two organisms where one organism, the parasite, benefits, while the other organism, the host, is harmed. A clear example of this is the relationship between ticks and dogs. The tick (parasite) benefits by feeding on the dog's blood for nourishment. Meanwhile, the dog (host) is harmed, suffering from skin irritation and potential disease transmission from the tick bite.

166. How do abiotic components, such as sunlight and air currents, influence a pond's physical characteristics?

Ans :

Abiotic components significantly shape the physical nature of a pond habitat:

- **Sunlight** : Bright sunlight increases the day temperature of the water and the surrounding area. It also drives the process of evaporation, affecting the water level.
- **Air Currents** : Wind or air currents blowing over the water surface create waves, which can range from gentle ripples to larger disturbances, mixing the water.

167. Explain the concept of commensalism with the example of orchids growing on trees.

Ans :

Commensalism is a type of relationship between two organisms where one organism benefits and the other is neither helped nor harmed. The interaction between orchids and trees is a perfect example. The orchid benefits by getting a place to grow, gaining access to sunlight and nutrients from the air and rain. The tree branch on which the orchid grows is completely unaffected by its presence.

168. Why do different organisms living in the same habitat, like a snake and a rodent, experience different conditions?

Ans :

Organisms in the same habitat experience different conditions primarily due to their unique behaviors and activity patterns:

- A forest might be warm during the day but cool at night.
- A rodent that is active during the day will face warmer temperatures and different predators than a snake that comes out at night.
- This variation in timing and activity allows them to coexist by partitioning the resources and environment of the same habitat.

169. What is a trophic level? Describe the first three trophic levels in a typical food chain.

Ans :

A trophic level refers to the specific position an organism occupies in a food chain, based on its feeding habits. The first three levels are fundamental to ecosystem structure. Producers, such as green plants that make their own food, are at the first trophic level. Herbivores, which eat the producers, are at the second trophic level. Small carnivores, which eat the herbivores, occupy the third trophic level.

170. Explain how the ancient text Vrikshayurveda's emphasis on soil nourishment relates to modern sustainable farming.

Ans :

The ancient text Vrikshayurveda's principles align with modern sustainable farming in its focus on soil health:

- The text advocates for continuously nourishing the soil using organic manure, such as Kunapa Jala, made from animal and plant waste.
- This approach avoids synthetic chemicals, similar to organic farming today, which aims to improve soil fertility naturally.

Click Here to Buy book on Amazon

145. What are the different types of ecosystems found in nature, and can they overlap?

Ans :

Nature has two main types of ecosystems : aquatic and terrestrial. Aquatic ecosystems include environments like ponds, rivers, and lakes. Terrestrial ecosystems encompass land-based areas such as forests, farms, grasslands, and even large trees. These different ecosystems can and often do overlap, for example where a river (aquatic) flows through a forest (terrestrial), creating an interactive boundary zone.

Download INDIA's Best Study app NODIA

146. Explain the interactions between biotic and abiotic components that are essential for plant growth and respiration.

Ans :

Several key interactions between biotic and abiotic components are vital for plants:

- **For food production** : Plants (biotic) use sunlight, carbon dioxide from the air, and water from the soil (abiotic) for photosynthesis.
- **For nutrients** : Soil (abiotic) provides the medium and essential nutrients that plants (biotic) need for healthy growth.
- **For respiration** : Air (abiotic) provides the oxygen that plants (biotic) require for the process of respiration.

147. The table classifies organisms from a forest ecosystem based on their feeding habits. From the completed table, identify the producer, a primary consumer, and a secondary consumer, and briefly explain their roles.

Name of the Organism	**Performs Photosynthesis**	**Feeds on Plants and Plant Products**	**Feeds on Animals**
Deer	No	Yes	No
Bengal Fox	No	No	Yes (eats mice, squirrels)
Tree	Yes	—	—

Ans :

The tree is the producer because it makes its own food through photosynthesis. The deer is a primary consumer (herbivore) as it feeds on plants. The Bengal Fox is a secondary consumer (carnivore) because it feeds on other animals like mice and squirrels.

NODIA

148. Describe the different categories of consumers based on their feeding habits, providing examples for each.

Ans :

Consumers, or heterotrophs, are categorized based on what they eat. Herbivores are consumers that feed exclusively on plants, with examples like deer and hare. Carnivores are those that eat only other animals, such as leopards. Omnivores are organisms that have a diet consisting of both plants and animals, with examples including crows, foxes, and mice.

149. How does a simple change like water pollution lead to a cascading negative impact on an ecosystem?

Ans :

A single change like water pollution can cause a series of negative effects:

- Pollution can cause aquatic plants to die, which reduces the amount of oxygen in the water.
- The lack of oxygen then leads to the death of fish populations.
- With fewer fish to prey on them, insect populations can increase dramatically and may spread to damage nearby crops.

150. What is a food web, and how does it show the interconnected ness of food chains?

Ans :

A food web is a network formed by the interlinking of multiple food chains within an ecosystem. It demonstrates the complex feeding relationships where a single organism may be eaten by two or more different types of organisms. This intricate network highlights how changes in one population can have wide-ranging effects on many other species in the community.

151. The table illustrates three types of interactions between pairs of organisms, with the outcome for each marked as beneficial (✓), harmful (×), or unaffected. Identify the type of relationship (mutualism, commensalism, or parasitism) for each pair.

- To combat these pests, farmers are forced to use more synthetic pesticides.
- This increased pesticide use pollutes the soil and water, harming other organisms and affecting the overall environmental and human health, demonstrating how one action can cause far-reaching ecological damage.

177. Explain the three main types of species interactions mutualism, commensalism, and parasitism with detailed examples for each.

Ans :

Organisms in an ecosystem interact in various ways, with three key types being mutualism, commensalism, and parasitism.

- **Mutualism** : This is an interaction where both participating organisms benefit. An excellent example is the relationship between bees and flowers; the bee gets nectar for food, and the flower gets pollinated in return.
- **Commensalism** : In this relationship, one organism benefits while the other is unaffected. Orchids growing on tree branches illustrate this, as the orchid gets a place to live and access sunlight without harming the tree.
- **Parasitism** : This is an interaction where one organism (the parasite) benefits at the expense of the other (the host). Ticks feeding on a dog's blood is a clear example, where the tick gains nourishment while the dog suffers from irritation and potential disease.

178. Evaluate the long-term environmental consequences of the Green Revolution's farming practices on soil and biodiversity.

Ans :

While the Green Revolution increased food production, its methods have led to significant long-term environmental problems.

- The overuse of synthetic fertilizers and pesticides has resulted in soil degradation, reducing its natural fertility by harming beneficial microorganisms and lowering organic matter content.
- Excessive extraction of groundwater for heavy irrigation has depleted water tables in many regions, creating water scarcity issues.
- The widespread practice of monoculture, or growing a single crop repeatedly, has reduced crop diversity and negatively impacted vital pollinators, weakening the resilience of the agricultural ecosystem.

179. What are food chains and food webs? Explain their significance in showing energy flow and feeding relationships.

Ans :

Food chains and food webs are models that describe the feeding relationships within an ecosystem.

- A **food chain** is a simple, linear sequence that shows how energy is transferred from one organism to another. It illustrates a direct "who eats whom" relationship, starting from a producer (like grass) to a series of consumers (like a hare and then a fox).
- A **food web** is a more realistic and complex representation, consisting of many interconnected food chains. It shows that most organisms have multiple food sources and are preyed upon by more than one predator, highlighting the intricate network of energy flow in an ecosystem.

180. Imagine a forest where all decomposers suddenly vanished. What would be the immediate and long-term consequences?

Ans :

The disappearance of decomposers would have catastrophic consequences for the forest ecosystem.

- **Immediate effect** : Dead organic matter, such as fallen leaves, dead animals, and waste products, would accumulate without breaking down. The forest floor would be littered with undecayed material.
- **Long-term effect** : The crucial process of nutrient recycling would stop. Essential nutrients locked in the dead matter would not be returned to the soil.
- **Consequence** : This would lead to impoverished, infertile soil, making it impossible for plants (the producers) to grow. Ultimately, the entire food web would collapse due to the lack of producers, leading to the extinction of all life in that forest.

181. Describe the various benefits that humans derive from healthy ecosystems like forests and aquatic systems.

Ans :

Downloaded from www.pdf.tube

A fish is adapted to an aquatic life and requires the abiotic component of water to live and breathe, which is present in the pond. The forest habitat, while having soil, lacks a body of water, making it an unsuitable environment for a fish to survive.

158. What are some of the key threats that are damaging various ecosystems across India today?

Ans :

Ecosystems across India are under threat from a range of human activities. Major problems include widespread deforestation, the overuse and depletion of natural resources, and pollution of forests, rivers, and coastal areas. Additionally, the spread of invasive species that outcompete native organisms and unsustainable land use practices are causing significant damage to the country's natural habitats.

159. Compare the characteristics of human-made ecosystems with those of natural ecosystems.

Ans :

Human-made and natural ecosystems have distinct characteristics:

- **Origin** : Natural ecosystems develop on their own, while human-made ones like farms and parks are created by people to meet specific needs.
- **Management** : Natural ecosystems are self-sustaining, whereas human-made ecosystems require continuous human care and management to function.
- **Purpose** : Human-made ecosystems can be designed to reduce pollution and support biodiversity, but their primary purpose is often for human benefit.

160. Describe the benefits that migratory birds bring to the different habitats they visit.

Ans :

Migratory birds migrate to India to avoid harsh climates and find food, and in doing so, they provide several ecological benefits. They play a significant role in maintaining balance by acting as pollinators or seed dispersers along their migration paths, effectively linking different habitats. Furthermore, many of these birds are predators of insect pests, which helps farmers control pest populations and supports healthy crop growth.

161. Why were the farming methods of the Green Revolution considered unsustainable despite increasing food production?

Ans :

The farming methods of the Green Revolution are now considered unsustainable for several key reasons:

- They rely on the overuse of synthetic chemicals like fertilizers and pesticides, which degrade the environment.
- There is excessive extraction of groundwater for irrigation, leading to depletion of water resources.
- The practice of growing only one type of crop for commercial gain (monoculture) reduces biodiversity and soil health.

Download INDIA's Best Study app NODIA

162. Describe the relationship of mutualism, using the example of honeybees and flowers from the text.

Ans :

Mutualism is a type of symbiotic relationship where both of the interacting organisms benefit from the association. A classic example is the interaction between honeybees and flowers. The bee gets nectar from the flower, which it uses as food. In return, as the bee moves from flower to flower collecting nectar, it carries pollen, which pollinates the flowers, enabling them to reproduce.

NODIA

163. How does overuse of pesticides negatively impact the populations of both pests and their natural predators?

Ans :

The overuse of pesticides disrupts the ecological balance in the following ways:

- It reduces the population of natural predators that feed on pests, as these predators are often sensitive to the chemicals.
- With fewer natural predators to control them, the population of pests can actually increase over time.
- Additionally, some pests may develop resistance to the pesticides, making them even more difficult to control in the long run.

164. A study compared two ponds and recorded the data shown in the table. Based on these findings, explain the indirect effect that the presence of fish has on the seed production of nearby plants.

3. Explain how cutting down trees for roads contributes to the human-elephant conflict described.

Ans :

1. The abiotic factors include scarce vegetation and the drying up of waterholes in their natural habitat.
2. The purpose is to allow the safe movement of animals like elephants between large forest areas without them coming into conflict with human settlements.
3. Cutting down trees for roads shrinks and dries the forests, which are the natural homes of animals. When the forest cannot support them, animals are forced to move into human habitats in search of food and water.

186. Researchers studied two ponds. Pond A had fish and many flowering plants nearby, while Pond B had no fish and fewer plants. They found that fish eat dragonfly larvae. Since dragonflies eat pollinators like bees, Pond A had fewer dragonflies but more pollinators. This led to more seed production in the plants near Pond A, showing an indirect ecological connection.

Questions:

1. What do the fish in Pond A eat that affects the dragonfly population?
2. Explain the direct effect of fewer dragonflies on the bee and butterfly populations in Pond A.
3. Trace the chain of events to explain how the presence of fish in a pond can indirectly lead to more seed production in nearby plants.

Ans :

1. The fish eat dragonfly larvae.
2. With fewer dragonflies to eat them, more bees, flies, and butterflies were found in Pond A.
3. Fish eat dragonfly larvae, reducing the number of adult dragonflies. With fewer dragonflies, more pollinators like bees survive. These insects pollinate more flowers, which helps the nearby plants produce more seeds.

187. In the 1980s, India exported a large number of Indian bullfrog legs, which led to a sharp decline in the frog population. Since frogs are natural predators of insects, their reduced numbers resulted in a rise in agricultural pests. This forced farmers to use more synthetic pesticides, which harmed the environment and human health, disrupting the ecosystem's balance.

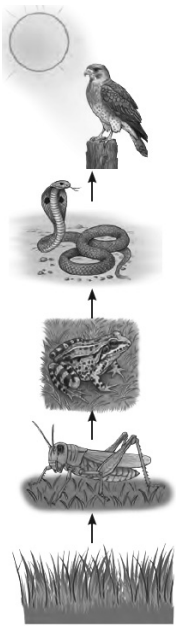
Questions:

1. What was the direct consequence of the large-scale harvesting of Indian bullfrogs?
2. In the food chain, what beneficial role did the frogs play for farmers?
3. Explain how one human action (exporting frog legs) led to another environmental problem (increased pesticide use).

Ans :

1. It led to a decline in the frog population.
2. The frogs ate insects, which helped control the population of agricultural pests.
3. Exporting frog legs reduced the frog population. With fewer frogs to eat them, insect pests increased. To control these pests, farmers were forced to use more synthetic pesticides, harming the environment.

188. A diagram of a grassland food web shows grasses at the base. The grasses are eaten by rabbits and mice. The mice are eaten by owls and snakes, while rabbits are eaten by foxes. The snakes are then eaten by hawks. This complex network shows how different organisms depend on each other for survival in an ecosystem.



Another food chain in a grassland

Questions:

1. In this food web, what type of organism is at the first trophic level?

Click Here to Buy book on Amazon

Ans :

1. The first event is that many plants in the pond start dying because of pollution.
2. With fewer plants, less oxygen is produced in the water, which leads to a drop in the fish population.
3. The reduction in fish allows the insect population to increase. These insects then spread from the pond to nearby farmlands, damaging crops and forcing farmers to use pesticides.

196. Many migratory birds fly thousands of miles to reach different habitats in India to avoid harsh climates and find food. These birds play a significant role in the ecosystems they visit. They act as pollinators or seed dispersers, linking two different habitats. They also help farmers by being predators of insect pests, thereby contributing to healthy crop growth.

Questions:

1. What are two reasons why birds migrate?
2. How do migratory birds help link two different habitats?
3. Explain how the presence of migratory birds can indirectly benefit a farmer.

Ans :

1. Birds migrate to avoid harsh climates and in search of food.
2. They link two habitats by acting as pollinators or seed dispersers along the path they migrate.
3. These birds are predators of insect pests and help farmers to control pest populations, which indirectly helps in healthy crop growth.

197. In any ecosystem, organisms compete for common resources like food, water, physical space, or sunlight. For example, frogs and fish may compete for small insect larvae in a pond. This competition is a natural process that helps control population sizes and keeps the ecosystem balanced. Without it, one species could multiply too much, causing an imbalance.

Questions:

1. What is competition in an ecosystem?
2. Name one resource that plants in a dense forest might compete for.
3. How does competition help to keep an ecosystem balanced?

Ans :

1. Competition is when organisms require common resources like food, water, or space.
2. Plants in a dense forest might compete for sunlight or water.
3. Competition helps control the population size of different species, preventing any one species from multiplying too much and causing an imbalance in the ecosystem.

198. Humans create artificial ecosystems like fish ponds, farms, and parks to meet their needs. A well-designed farm, for example, is a human-made ecosystem that interacts with natural ecosystems around it. Unlike natural ecosystems that are self-sustaining, these artificial systems need continuous human care and management to remain productive and support biodiversity.

Questions:

1. Name two examples of human-made ecosystems.
2. What is the main difference between a natural ecosystem and a human-made one?
3. Why is a farm considered an ecosystem? What are its biotic and abiotic components?

Ans :

1. Two examples are farms and parks.
2. Unlike natural ecosystems, human-made ecosystems need human care and management to function.
3. A farm is an ecosystem because its biotic components (crops, livestock, insects, microorganisms) and abiotic components (soil, water, sunlight, air) interact with each other.

199. Green plants are called producers or autotrophs because they make their own food through the process of photosynthesis. They use abiotic components like sunlight, carbon dioxide, and water to produce food. All other organisms, known as consumers or heterotrophs, depend directly or indirectly on these producers for their food and energy, placing them at the base of every food chain.

Questions:

1. Why are green plants called producers?
2. What three abiotic components are essential for plants to produce food?
3. Explain why it is impossible to have an ecosystem with only consumers and decomposers, and no producers.

Ans :

NODIA

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

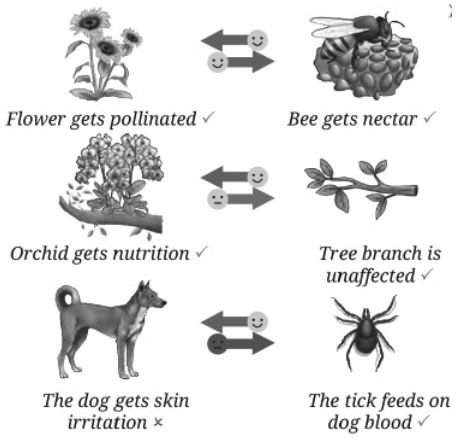
- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

192. A diagram shows three types of interactions between organisms. A bee gets nectar from a flower, and the flower gets pollinated (mutualism). An orchid grows on a tree, getting nutrition without affecting the tree (commensalism). A tick feeds on a dog's blood, irritating the dog (parasitism). These interactions are part of the complex web of life.


Flower gets pollinated ✓
Bee gets nectar ✓
Orchid gets nutrition ✓
Tree branch is unaffected ✓
The dog gets skin irritation ×
The tick feeds on dog blood ✓

Different types of interactions between organisms

Questions:

1. What is the type of interaction where one organism benefits and the other is harmed?
2. In the relationship between the bee and the flower, how does each organism benefit?
3. Compare commensalism and parasitism. What is the key difference in how the second organism is affected?

Ans :

1. This interaction is called parasitism.
2. The bee gets nectar for food, and the flower gets pollinated, which is essential for it to produce seeds.
3. In commensalism, the second organism is unaffected. In parasitism, the second organism (the host) is harmed.

193. In a pond habitat, many different populations live together. These include populations of fish, frogs, snails, and various aquatic plants. All of these living beings the plants, animals, and microorganisms interact with each other and depend on one another for survival. Together, these different populations sharing the same habitat form a community.

Questions:

1. What is a habitat?
2. What is the difference between a population and a community?
3. Name three different populations that might be found in a pond community.

Ans :

1. A habitat is a place where an organism lives.
2. A population is a group of the same type of organisms in a habitat, while a community comprises different populations sharing the same habitat.
3. Three populations could be fish, frogs, and ducks.

NODIA

194. In a simple crop field food chain, there is one eagle, several mice, and many millet plants. When arranged by their numbers, the producers (millet) form the large base of a pyramid, the primary consumers (mice) form the middle level, and the top carnivore (eagle) is at the peak. This pyramid shape shows how the number of organisms generally decreases at higher trophic levels.

Questions:

1. In a food chain, what is the specific position an organism occupies called?
2. In the millet-mouse-eagle food chain, which organism is at the second trophic level?
3. Why are there typically far fewer large carnivores than herbivores in an ecosystem?

Ans :

1. It is called a trophic level.
2. The mouse, a herbivore, is at the second trophic level.
3. The pyramid structure shows that the number of organisms decreases at each successive level. The highest number is at the base (producers), and the lowest is at the top (top carnivores), reflecting the flow of energy.

195. Pollution causes many plants in a pond to die. With fewer plants, less oxygen is produced, leading to a drop in the fish population. With fewer fish to eat them, the number of insects increases. These insects spread to nearby farms, compelling farmers to use pesticides, which can further harm the environment, showing how one small change can have cascading effects.

Questions:

1. What is the first event in this chain reaction caused by pollution?
2. How does the death of pond plants lead to the death of fish?
3. Explain how an event occurring in an aquatic ecosystem (the pond) can eventually affect a terrestrial ecosystem (the farmland).

2. Identify one herbivore and one carnivore from the food web described.
3. If a disease were to wipe out the mouse population, which two predators would be most directly affected by the loss of their food source?

Ans :

1. Producers, like the grasses, are at the first trophic level.
2. The rabbit is a herbivore (eats grasses), and the fox is a carnivore (eats rabbit).
3. The owl and the snake would be most directly affected, as the diagram shows both of them preying on mice.

189. During the rainy season, small umbrella-like mushrooms are seen growing on dead plants. These mushrooms are a type of fungi that, along with bacteria, act as decomposers or saprotrophs. They break down complex substances in dead organic matter into simpler ones, returning important nutrients to the soil. In nature, this ensures that nothing is wasted.

Questions:

1. What are organisms that break down dead matter and recycle nutrients called?
2. What is the essential role that decomposers play in an ecosystem?
3. If all decomposers suddenly disappeared from a forest, what would be the long-term consequence for the producers (plants)?

Ans :

1. They are called decomposers or saprotrophs.
2. Decomposers play an important role in recycling nutrients in an ecosystem.
3. The dead organic matter would not be broken down, and important nutrients would not be returned to the soil. This would eventually lead to a lack of nutrients for the plants, affecting their growth and the health of the entire ecosystem.

190. The Sundarbans, the world's largest mangrove forest, is a World Heritage Site that protects coastal areas from storms. However, this ecosystem is under serious threat from human activities. Mangrove trees are being cut for fuelwood and farming, illegal hunting threatens wildlife, and pollution from industrial waste and sewage is damaging the water and habitats.

Questions:

1. What is one important protective function that the Sundarbans' mangrove forests provide?
2. List two human activities that are damaging the Sundarbans ecosystem.
3. Explain why pollution from industrial waste is a threat to the wildlife living in the Sundarbans.

Ans :

1. The Sundarbans protect coastal communities by slowing down strong winds and waves during storms and floods.
2. Two damaging activities are cutting mangrove trees for fuelwood and illegal hunting of wildlife.
3. Pollution from industrial waste and untreated sewage damages the water and the habitat, which disrupts the natural way the ecosystem works and harms the flora and fauna living there.

191. The Green Revolution increased food production using synthetic fertilisers and pesticides. However, long-term overuse of these chemicals is unsustainable. It can reduce soil fertility by decreasing friendly microorganisms and organic matter, making soil prone to erosion. Understanding ecosystems helps farmers adopt better, more sustainable practices like organic farming to protect soil health for the future.

Questions:

1. Why are the farming methods of the Green Revolution now considered unsustainable?
2. How does the overuse of synthetic fertilisers harm soil health?
3. What is one benefit of exploring organic and natural farming methods?

Ans :

1. They are considered unsustainable because of the overuse of synthetic chemicals, excessive groundwater extraction, and growing only one type of crop.
2. It may reduce soil fertility by decreasing friendly microorganisms and lowering the amount of organic matter (humus).
3. These methods aim to reduce the use of synthetic fertilisers and support sustainable farming with minimal interference in natural ecosystems.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

1. They are called producers because they make their own food by the process of photosynthesis.
2. Three essential abiotic components are sunlight, carbon dioxide, and water.
3. Producers are the only organisms that can create their own food from abiotic sources. Consumers and decomposers are heterotrophs, meaning they depend on other organisms for food. Without producers, there would be no initial source of energy to support the consumers and decomposers.

****

NODIA

5. You notice tiny green plants growing in cracks on your school wall after the monsoon. Where do you think the seeds came from? What conditions helped these plants grow there?

Ans :

The seeds were likely dropped there by a bird. A bird might have eaten a fruit and later excreted the seed, which fell into the crack on the wall.
The conditions that helped the seeds grow were:

1. Water from the monsoon rains.
2. Nutrients from the soil and organic debris collected inside the crack.
3. Sunlight and air.

6. A city has recently cut down a large patch of forest to build new roads and buildings. Discuss the possible effects this could have on the local climate and biodiversity. How might this affect water availability or quality in the area?

Ans :

Cutting down a forest has several negative effects:
Effect on Climate and Biodiversity : It destroys the natural habitat for countless plants and animals, leading to a loss of biodiversity. With fewer trees to absorb carbon dioxide, the local climate can become warmer. The removal of forests can also disrupt local rainfall patterns.
Effect on Water:
Forests play a key role in the water cycle. Without trees, there is increased soil erosion and less water is absorbed into the ground to recharge groundwater. This can reduce the availability of fresh water. Runoff from the city streets can carry pollutants into rivers and streams, negatively affecting water quality.

7. A friend says, "The Earth has always had climate changes in the past, so today's global warming is nothing new." How would you respond using what you've learnt in this and other chapters of your science book?

Ans :

While it's true that the Earth's climate has changed naturally in the past, today's global warming is different and more alarming. The key difference is the speed of the change and its cause. The current warming is happening much faster than past natural cycles and is primarily caused by human activities, especially the burning of fossil fuels like coal and oil. This process releases huge amounts of extra carbon dioxide into the atmosphere, trapping more heat and disrupting the planet's delicate balance much faster than nature can handle.

8. Imagine Earth's magnetic field suddenly disappeared. What kinds of problems could arise for life on Earth? Explain.

Ans :

If the Earth's magnetic field disappeared, life on Earth would face serious problems. The magnetic field acts as a protective shield. It deflects harmful, high-energy particles coming from the sun (solar wind) and deep space (cosmic rays). Without this shield, these harmful particles would bombard our planet, which could:
Damage or strip away our atmosphere.

1. Weaken the ozone layer, letting in more harmful ultraviolet (UV) rays.
2. Directly harm living organisms, potentially making life on the surface impossible.

9. You are tasked with designing a new settlement for humans on Mars. Name three things you would need to recreate from Earth to support human life there. Which of these do you think is the hardest to replicate, and why?

Ans :

To support human life on Mars, we would need to recreate:

1. A breathable atmosphere containing oxygen for respiration.
2. A stable supply of liquid water for drinking and agriculture.
3. Protection from radiation, similar to what is provided by Earth's atmosphere and magnetic field.

The hardest to replicate would be a planet-wide, self-sustaining atmosphere and magnetic field. Creating an artificial magnetic shield and generating and maintaining a thick, breathable atmosphere on a planetary scale is a monumental challenge far beyond our current technology.

10. In a village, the temperature has been increasing and rainfall has become unpredictable over the past few years. What could be causing this change? Suggest two ways the village could adapt to these new conditions.

Ans :

The most likely cause of these changes is climate change, which is driven by global warming. The increase in greenhouse gases in the atmosphere

Click Here to Buy book on Amazon

3.2 Asexual Reproduction

This involves a single parent producing new individuals. The offspring are exact copies of the parent. Examples include vegetative propagation in plants (e.g., growing a new potato plant from an 'eye') and simple division in microbes like bacteria.

3.3 Sexual Reproduction

This involves two parents who produce specialized reproductive cells called gametes(e.g., sperm and egg).Fertilisation is the fusion of a male and female gamete to form a new cell called a zygote. The zygote receives a mix of genes from both parents, creating a unique individual with a combination of traits.

4. THREATS TO LIFE ON EARTH

Human activities are disrupting Earth's natural balance and threatening life.

4.1 The Triple Planetary Crisis

This term refers to the three biggest environmental challenges facing our planet:

1. Climate Change : The burning of fossil fuels releases greenhouse gases that trap extra heat, causing global warming, rising sea levels and extreme weather.
2. Biodiversity Loss : The destruction of habitats is causing plants and animals to disappear, which weakens entire ecosystems.
3. Pollution : Air, water and soil pollution from factories, farms and waste harms human health and the environment.

4.2 The Path Forward : Sustainable Action

Protecting life on Earth requires collective action. This includes reducing pollution, switching to renewable energy (like solar and wind), preserving biodiversity and adopting sustainable practices like reusing, repairing and recycling.

NCERT EXERCISE

1. What is one major reason Mars cannot currently support life like Earth?
(i) It has too many volcanoes.
(ii) It is too close to the Sun.
(iii) It lacks a thick atmosphere and liquid water.
(iv) Its magnetic field is too strong.

Ans :

(iii) It lacks a thick atmosphere and liquid water.
Mars' atmosphere is about 100 times thinner than Earth's, and it lacks the surface liquid water that is essential for life as we know it.

NODIA

2. Which of these is an example of geodiversity?
(i) Variety of bird chirping in a forest.
(ii) Different landforms like mountains, valleys and deserts.
(iii) Changing weather during monsoons.
(iv) Number of different types of fish in a pond.

Ans :

(ii) Different landforms like mountains, valleys, and deserts.
Geodiversity refers to the variety of non-living elements of nature, such as landforms, rocks, and soils. The variety of living things, like birds or fish, is known as biodiversity.

3. If the Earth were smaller with the same density, what might happen to its atmosphere?
(i) It would become thicker and hotter.
(ii) It would escape into space due to weaker gravity.
(iii) It would become frozen.
(iv) It would cause stronger winds.

Ans :

(ii) It would escape into space due to weaker gravity.
The Earth's size gives it just the right amount of gravity to hold onto its atmosphere. If the Earth were much smaller, its gravity would be too weak to prevent the atmospheric gases from escaping into space.

4. In sexual reproduction, why are offspring different from their parents?
(i) They grow in different climates.
(ii) They eat different food.
(iii) They acquire new instructions after birth.
(iv) They get mixed instructions (genes) from both parents.

Ans :

(iv) They get mixed instructions (genes) from both parents.
In sexual reproduction, a new organism is formed from the combination of genetic material (genes) from two parents. This mixing of instructions results in offspring that share some traits with both parents but are not identical to either one.

Ans :

(C) Venus has a thick CO_2 atmosphere that traps heat.
Venus has an extreme greenhouse effect. Its dense atmosphere, rich in carbon dioxide, acts like a thick blanket, trapping solar heat and raising the planet's surface temperature to be the highest in the solar system.

16. If the Earth were much smaller, what would be the most likely consequence for its atmosphere?
(A) The atmosphere would become much thicker and denser.
(B) The atmosphere would have a higher concentration of oxygen.
(C) There would be no change to the atmosphere.
(D) The atmosphere would escape into space due to weaker gravity.

Ans :

(D) The atmosphere would escape into space due to weaker gravity.
A planet's size determines its mass and, consequently, its gravitational pull. A much smaller Earth would have weaker gravity, which would be insufficient to hold onto the fast-moving gas particles of an atmosphere.

17. What is the primary role of the Earth's magnetic field in sustaining life?
(A) It acts as a shield against harmful solar wind and cosmic rays.
(B) It keeps the Earth at the correct distance from the Sun.
(C) It is the primary cause for the changing of the seasons.
(D) It holds the planet's vast oceans securely in place.

Ans :

(A) It acts as a shield against harmful solar wind and cosmic rays.
The Earth's magnetic field deflects most of the high-energy charged particles streaming from the Sun and deep space. This protective shield prevents these particles from stripping away our atmosphere and damaging living organisms.

18. What is the primary function of reproduction in living organisms?
(A) To allow an individual organism to grow much larger in size.
(B) To ensure the continuity of a species from one generation to the next.
(C) To provide the necessary energy for an organism's daily activities.
(D) To help organisms adapt to short-term changes in the weather.

Ans :

(B) To ensure the continuity of a species from one generation to the next.
Reproduction is the biological process by which new individual organisms are produced. Its fundamental purpose is to pass on genetic information and ensure that a species continues to exist over time.

19. A potato growing a new plant from a sprouted 'eye' is an example of which type of reproduction?
(A) Sexual reproduction
(B) Pollination
(C) Asexual reproduction (vegetative propagation)
(D) Fertilization

Ans :

(C) Asexual reproduction (vegetative propagation)
This is a form of asexual reproduction, as it involves only one parent plant and the new plant grows from a vegetative part (the tuber). The resulting new plant is genetically identical to the parent.

20. What is a key difference between asexual and sexual reproduction?
(A) Asexual reproduction involves two parents, while sexual reproduction involves one.
(B) Only plants can reproduce asexually.
(C) Sexual reproduction is a much faster process than asexual reproduction.
(D) Asexual reproduction produces genetically identical offspring, while sexual reproduction produces variation.

Ans :

(D) Asexual reproduction produces genetically identical offspring, while sexual reproduction produces variation.
Asexual reproduction involves a single parent passing all its genes to the offspring, creating a clone. Sexual reproduction combines genetic material from two parents, resulting in offspring with a unique combination of traits.

Download INDIA's Best Study app NODIA

Downloaded from www.pdf.tube

is altering long-term temperature and weather patterns globally.
Two ways the village could adapt are:
1. Water Management : Practice rainwater harvesting to collect and store water during rainfall for use during dry periods.
2. Sustainable Agriculture : Plant crops that are more resistant to drought and heat, and improve soil health to retain more moisture.

11. If there were no atmosphere on the Earth, would it affect life, temperature, and water on the planet? Explain.

Ans :

Yes, an absence of an atmosphere would make Earth uninhabitable.
1. Life : Without oxygen for respiration or an ozone layer to block harmful UV rays, most life as we know it could not exist.
2. Temperature : The atmosphere traps heat through the greenhouse effect. Without it, Earth would lose its heat to space and become extremely cold, with drastic temperature swings between day and night.
3. Water : The warmth and pressure from the atmosphere allow water to exist as a liquid. Without an atmosphere, water on the surface would either freeze due to the extreme cold or boil away into space.

12. Discuss five examples of vegetative propagation.

Ans :

Vegetative propagation is a type of asexual reproduction where a new plant grows from a part of the parent plant, like its stem, leaf, or root. Five examples include:
1. Potato : A new plant can grow from the buds, or 'eyes', on a potato tuber.
2. Ginger : A new plant grows from a piece of the underground stem (rhizome) of a ginger plant.
3. Money Plant : A new plant can be grown simply by placing a piece of its stem in water or moist soil.
4. Sugarcane : New plants sprout from the nodes on a piece of the sugarcane stem when it is planted.
5. Rose : A new rose bush can be grown by planting a cutting from the stem of an existing plant.

Download INDIA's Best Study app NODIA

MULTIPLE CHOICE QUESTION

NODIA

13. The chapter uses the analogy of an apple to describe the Earth's crust. What is the main point of this analogy?
(A) The crust, where all life exists, is very thin compared to the Earth.
(B) The crust is colored red much like an apple's skin.
(C) The Earth's inner core is exactly like the core of an apple.
(D) The crust of the Earth is both sweet and completely edible.

Ans :

(A) The crust, where all life exists, is very thin compared to the Earth.
This analogy emphasizes the scale and fragility of the biosphere. Just as an apple's skin is a very thin layer on its surface, the Earth's crust, which supports all known life, is a delicate and proportionally thin layer on our planet.

14. What is the "habitable zone" (or "Goldilocks zone") around a star?
(A) The specific area where a planet receives the most direct sunlight.
(B) The range of distances from a star where liquid water can exist.
(C) The region where a planet is large enough to have a magnetic field.
(D) The part of a solar system where there are no large asteroids.

Ans :

(B) The range of distances from a star where liquid water can exist.
The habitable zone is the orbital region where conditions are "just right" for life as we know it. This means the planet is not too hot for water to evaporate and not too cold for it to freeze, allowing it to exist in a liquid state.

15. Why is Venus hotter than Mercury, even though Mercury is closer to the Sun?
(A) Mercury has a strong magnetic field which cools it down.
(B) Venus rotates much faster, which generates more heat.
(C) Venus has a thick CO_2 atmosphere that traps heat.
(D) Mercury is a smaller planet and it loses heat quickly.

CHAPTER 13

OUR HOME : EARTH, A UNIQUE LIFE SUSTAINING PLANET

SUMMARY

1. EARTH : A UNIQUE HABITABLE PLANET

All life as we know it exists on Earth's crust, a very thin outer layer comparable to the skin of an apple. Several "just right" conditions make our planet uniquely capable of supporting life.

1.1 The "Goldilocks" Conditions

1.1.1 The Right Distance from the Sun

1. Earth orbits the Sun within the "habitable zone,"a region where temperatures are perfect for water to exist in liquid form.
2. If Earth were closer to the Sun, its water would evaporate; if it were farther, all its water would freeze. Liquid water is considered essential for life to evolve.

Download INDIA's Best Study app NODIA

1.1.2 The Right Size and Gravity

1. Earth's size is ideal for life. Its gravity is strong enough to hold onto its atmosphere, preventing essential gases from escaping into space.
2. A smaller planet's gravity would be too weak (like Mars), while a much larger planet's gravity would be too strong for life as we know it.

1.1.3 A Protective Atmosphere and Magnetic Field

1. The atmosphere contains oxygen for respiration and an ozone layer that acts as a shield, blocking harmful ultraviolet (UV) radiation from the Sun.
2. Earth's magnetic field protects the planet by deflecting harmful high-energy particles from the sun (solar wind) and space.

2. THE SYSTEMS THAT SUSTAIN LIFE

Life is sustained on Earth through the complex interaction of its major systems.

2.1 The Interconnected Spheres

1. Atmosphere (Air) : Provides gases for respiration (oxygen) and photosynthesis (carbon dioxide) and helps regulate temperature through a mild greenhouse effect.
2. Hydrosphere (Water) : Covers about 70% of Earth's surface and is essential for all life processes, including regulating body temperature and transporting nutrients.
3. Geosphere (Land) : The Earth's crust, made of rocks, soil, and minerals, provides nutrients for plants to grow and essential materials for ecosystems and human life.
4. Biosphere (Life) : Includes all living beings, which interact with each other and the non-living environment to survive and grow.

2.2 The Importance of Balance in Nature

Life on Earth thrives because all these systems work together in a delicate balance. A small change in one part, such as deforestation, can have a cascading impact on the climate, soil, and wildlife.

3. THE CONTINUITY OF LIFE : REPRODUCTION

Reproduction is the process that ensures life continues on Earth.

3.1 The Role of Genes

1. Parents pass on instructions to their offspring through genes. This is why offspring resemble their parents.
2. Reproduction also allows for small changes in these instructions, leading to variations that can help a species adapt and evolve over time.

Click Here to Buy book on Amazon

21. In flowering plants, what are the male and female gametes, respectively?
(A) Pollen grains and ovules
(B) Sperm and ovules
(C) Anther and pollen grains
(D) Ovules and sperm

Ans :

(A) Pollen grains and ovules
In the sexual reproduction of flowering plants, the pollen grains, which are produced in the anther, contain the male gametes. The ovules, which are contained within the ovary of the flower, are the female gametes.

22. Which of the following is NOT part of the "triple planetary crisis" threatening life on Earth?
(A) Climate change
(B) The Earth's magnetic field reversal
(C) Biodiversity loss
(D) Pollution

Ans :

(B) The Earth's magnetic field reversal
The three major, interconnected environmental challenges as climate change, the loss of biodiversity, and widespread pollution. Magnetic field reversal is a natural, long-term geological process and not part of this immediate crisis.

23. Hydrosphere is to water as geosphere is to _____.
(A) Air
(B) Life
(C) Rocks and soil
(D) Oceans

Ans :

(C) Rocks and soil
This analogy relates Earth's spheres to their primary components. The hydrosphere encompasses all of Earth's water. The geosphere refers to the solid parts of the Earth, including rocks, minerals, and soil.

24. What is the main cause of the current trend of global warming and climate change?
(A) Natural cycles of the Sun's energy output.
(B) An increase in volcanic activity worldwide.
(C) The Earth moving closer to the Sun in its orbit.
(D) The release of greenhouse gases from human activities like burning fossil fuels.

Ans :

(D) The release of greenhouse gases from human activities like burning fossil fuels.
While Earth's climate has natural cycles, the current rapid warming is primarily caused by the enhanced greenhouse effect. This is due to the large amounts of gases like carbon dioxide released from burning fossil fuels, which trap more heat in the atmosphere.

Download INDIA's Best Study app NODIA

25. The Montreal Protocol is a global agreement that was successful in phasing out harmful chemicals to protect what crucial part of the atmosphere?
(A) The ozone layer
(B) The greenhouse gas layer
(C) The magnetic field
(D) The water vapor content

Ans :

(A) The ozone layer
The Montreal Protocol was specifically designed to address the depletion of the ozone layer. It successfully orchestrated the global phase-out of ozone-depleting substances like chlorofluorocarbons (CFCs), allowing the protective ozone layer to begin its recovery.

26. In reproduction, what are the specialized reproductive cells that carry half of a parent's genetic material called?
(A) Zygotes
(B) Gametes
(C) Embryos
(D) Tissues

Ans :

(B) Gametes
Gametes are the reproductive cells of an organism, such as sperm and egg cells in animals or pollen and ovules in plants. They are haploid, meaning they contain only one set of chromosomes, or half the genetic material of the parent.

27. Why is liquid water considered essential for life as we know it?
(A) Because it is the only substance that is known to be able to freeze.
(B) Because it is able to protect planets from dangerous asteroid impacts.
(C) Because it is an excellent solvent and facilitates chemical reactions.
(D) Because it is the main component of a planet's thick atmosphere.

Downloaded from www.pdf.tube

52. The fact that all life on Earth is found within a thin layer on its surface highlights the _____.
(A) Fragility and preciousness of the biosphere
(B) Durability and strength of life
(C) Vastness and emptiness of the planet's interior
(D) Unimportance of the atmosphere

Ans :

(A) Fragility and preciousness of the biosphere
By emphasizing that all life is confined to the "thin skin of an apple," the text underscores how delicate and limited the life-supporting layer of our planet is. This perspective encourages an appreciation for its precious and fragile nature.

53. A scientist discovers a new planet. To determine if it is in the habitable zone, what is the most important factor to measure?
(A) The number of moons it has in its orbit.
(B) The overall strength of its planetary magnetic field.
(C) Its average surface temperature for liquid water potential.
(D) The specific color of its upper atmosphere.

Ans :

(C) Its average surface temperature for liquid water potential.
The primary definition of the habitable zone is based on temperature. A scientist would need to determine if the planet's distance from its star and its atmospheric properties result in a surface temperature that would allow water to be in its liquid state.

54. How do the reproductive cells (gametes) differ from other cells in the body (somatic cells)?
(A) Gametes are larger than somatic cells.
(B) Gametes contain half the amount of genetic material.
(C) Gametes contain twice the amount of genetic material.
(D) Somatic cells can move on their own, but gametes cannot.

Ans :

(B) Gametes contain half the amount of genetic material.
Somatic (body) cells have a full set of chromosomes. Gametes are specialized for sexual reproduction and undergo a process that halves their chromosome number, so that when two gametes fuse, the resulting zygote has a complete, not a doubled, set.

NODIA

55. Which of the following human actions directly addresses the problem of biodiversity loss?
(A) Building more large factories that release greenhouse gases.
(B) Using single-use plastic bags instead of reusable ones.
(C) Establishing a national park to protect a forest and its wildlife.
(D) Overusing various types of chemical fertilizers on farmland.

Ans :

(C) Establishing a national park to protect a forest and its wildlife.
Biodiversity loss is primarily driven by habitat destruction. Creating protected areas like national parks directly counteracts this by setting aside land where ecosystems are preserved and the variety of species within them can thrive without human disturbance.

56. The fusion of male and female gametes to form a new cell is called _____.
(A) Germination
(B) Division
(C) Pollination
(D) Fertilization

Ans :

(D) Fertilization
Fertilization is the specific biological term for the process where two gametes one male and one female unite. This fusion combines their genetic material and marks the beginning of the development of a new, unique individual.

57. Why are plants like bamboo and sugarcane often grown from cuttings rather than from seeds?
(A) Because growing them from cuttings is a faster and more reliable form of asexual reproduction.
(B) Because they do not produce seeds.
(C) Because seeds from these plants are poisonous.
(D) Because sexual reproduction is more efficient for these plants.

Ans :

(A) Because growing them from cuttings is a faster and more reliable form of asexual reproduction.
Vegetative propagation is a common agricultural practice. It allows for the rapid production of new plants that are genetically identical to the parent, ensuring desirable traits are preserved. It can often be a faster way to get a mature plant than starting from a seed.

33. The variety of different landforms, rocks, and soils that create unique habitats is known as _____.
(A) Geodiversity
(B) Biodiversity
(C) The biosphere
(D) The ecosystem

Ans :

(A) Geodiversity
Geodiversity refers to the variety of non-living (abiotic) elements of nature, including geological features, landforms, and soil types. This physical variety is the foundation upon which different ecosystems and biodiversity develop.

34. What allows life on Earth to adapt to changing environments over many generations?
(A) The fact that all of the offspring are identical to their parents.
(B) The genetic variation that is created by sexual reproduction.
(C) The extremely constant temperature of the Earth's inner core.
(D) The natural process of decomposition that recycles nutrients.

Ans :

(B) The genetic variation that is created by sexual reproduction.
Sexual reproduction shuffles genes from two parents, creating unique combinations in the offspring. This variation means that some individuals may have traits that make them better suited to survive and reproduce in a changing environment, driving the process of evolution.

35. What is the name for all the living beings on Earth, along with the places where they live (land, water, and air)?
(A) Geosphere
(B) Atmosphere
(C) Biosphere
(D) Hydrosphere

Ans :

(C) Biosphere
The biosphere is the term for the global sum of all ecosystems. It encompasses every living organism, from the deepest ocean trenches to high in the atmosphere, and their interactions with the non-living environment.

Download INDIA's Best Study app NODIA

36. India's Mars Orbiter Mission, which successfully reached Mars, is also known by what name?
(A) AstroSat
(B) Chandrayaan
(C) Bhuvan
(D) Mangalyaan

Ans :

(D) Mangalyaan
Mangalyaan, which translates to "Mars-craft," is the popular name for ISRO's Mars Orbiter Mission (MOM). It made India the first nation to succeed in its first interplanetary mission.

37. Atmosphere is to air as _____ is to water.
(A) Hydrosphere
(B) Geosphere
(C) Biosphere
(D) Lithosphere

Ans :

(A) Hydrosphere
This analogy relates one of Earth's major spheres to its primary component. The atmosphere is the sphere of air surrounding the planet. The hydrosphere is the sphere that comprises all the water on Earth's surface.

38. Which of these is an INCORRECT statement about Earth's unique suitability for life?
(A) Its specific distance from the sun allows for liquid water to exist.
(B) It has a thick atmosphere made almost entirely of carbon dioxide.
(C) Its gravity is strong enough to hold onto a breathable atmosphere.
(D) Its magnetic field offers good protection from harmful solar winds.

Ans :

(B) It has a thick atmosphere made almost entirely of carbon dioxide.
Earth's atmosphere is mostly nitrogen and oxygen. It is Venus that has a thick atmosphere made almost entirely of carbon dioxide, which creates a runaway greenhouse effect and makes it inhospitable.

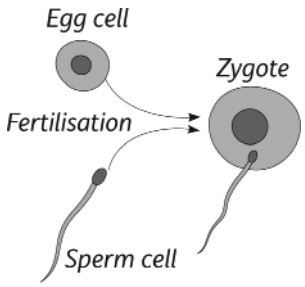
39. If a banyan seed is dropped by a bird in the crack of a wall and it sprouts after the rains, this is an example of seed dispersal followed by _____.
(A) Pollination
(B) Fertilization
(C) Germination
(D) Vegetative propagation

Click Here to Buy book on Amazon

Ans :

(C) Because it is an excellent solvent and facilitates chemical reactions.
Water's ability to dissolve many different substances allows it to transport nutrients and waste products within cells and organisms. This property is fundamental to the complex biochemical reactions that define life.

28. Figure shows the fusion of a sperm cell and an egg cell. What is this process of fusion called, and what is the resulting cell named?



(A) Process : Pollination, Result : Seed
(B) Process : Division, Result : Gamete
(C) Process : Germination, Result : Embryo
(D) Process : Fertilization, Result : Zygote

Ans :

(D) Process : Fertilization, Result : Zygote
Fertilization is the process where a male gamete (sperm) and a female gamete (egg) unite. The single cell that results from this fusion, containing a complete set of genetic instructions from both parents, is called a zygote.

29. What is a key difference in the development of an embryo in most mammals compared to birds?
(A) Mammals are known to lay eggs, while birds give live birth.
(B) Mammal embryos develop inside the mother's body with nutrition.
(C) In mammals, development is external; in birds, it is internal.
(D) Bird embryos do not require any oxygen in order to develop.

Ans :

(B) Mammal embryos develop inside the mother's body with nutrition.
Most mammals have internal embryonic development, where the embryo grows within the mother's uterus and is nourished through the placenta. Birds lay eggs, so the embryo develops externally, relying on the nutrients stored in the yolk.

30. In asexual reproduction, a _____ parent produces offspring that are genetically _____.
(A) Single, different
(B) Pair of, identical
(C) Single, identical
(D) Pair of, different

Ans :

(C) Single, identical
Asexual reproduction is characterized by the involvement of only one parent. Because the offspring arises from the cells of that single parent, it inherits the same set of genes and is therefore a genetic clone.

31. Which of the following is NOT a reason Earth is considered the 'blue planet'?
(A) Its atmosphere is primarily composed of a blue-colored gas.
(B) A large portion of its surface is covered by water.
(C) Oceans and water bodies reflect blue light.
(D) It appears blue when viewed from space.

NODIA

Ans :

(A) Its atmosphere is primarily composed of a blue-colored gas.
The Earth appears blue from space primarily because of its vast oceans. While the atmosphere does scatter blue light (making the sky blue from the ground), it is not itself a blue gas. The dominant reason for the 'blue planet' moniker is the water.

32. A farmer uses the practice of reusing, repairing, and recycling materials on the farm. This action primarily helps to _____.
(A) Increase biodiversity loss
(B) Increase the effects of climate change
(C) Reduce pollution and waste
(D) Strengthen the greenhouse effect

Ans :

(C) Reduce pollution and waste
The principles of "reuse, repair, recycle" are central to sustainable living. By following them, the farmer reduces the demand for new resources and minimizes the amount of waste sent to landfills, thereby decreasing pollution and conserving the environment.

46. How does a greenhouse for plants trap heat differently from the greenhouse effect on a planet?
(A) There is no real difference; both use gases to trap radiation.
(B) A greenhouse traps warm air; an atmosphere absorbs radiation.
(C) The planet's atmosphere traps air; a greenhouse absorbs radiation.
(D) A greenhouse reflects all sunlight, while the atmosphere absorbs it.

Ans :

(B) A greenhouse traps warm air; an atmosphere absorbs radiation.
A physical greenhouse works by preventing the warm air inside from escaping and mixing with cooler outside air (convection). The planetary greenhouse effect works because specific gases in the atmosphere absorb infrared radiation emitted from the surface, trapping the heat.

47. Which of the following is NOT a characteristic of sexual reproduction?
(A) It involves two parents.
(B) It creates genetic variation in offspring.
(C) The offspring are genetically identical to one parent.
(D) It involves the fusion of gametes.

Ans :

(C) The offspring are genetically identical to one parent.
The combination of genetic material from two different parents is the hallmark of sexual reproduction. This process ensures that the offspring are genetically unique and not identical to either parent, which is a key difference from asexual reproduction.

48. To combat climate change, one of the most effective long-term strategies is to _____.
(A) Build more large sea walls to stop the rising of the oceans
(B) Move all major cities to the colder regions of the planet
(C) Create new species that can survive in much warmer temperatures
(D) Transition from fossil fuels to using renewable energy sources

Ans :

(D) Transition from fossil fuels to using renewable energy sources
The root cause of modern climate change is the excess of greenhouse gases released by burning fossil fuels. The most direct and effective solution is to reduce these emissions by switching to clean, renewable energy sources like solar and wind power.

49. The ozone layer protects life by blocking harmful _____, while the greenhouse effect helps by _____ heat.
(A) Ultraviolet rays, trapping
(B) Cosmic rays, creating
(C) Infrared rays, blocking
(D) Visible light, releasing

Ans :

(A) Ultraviolet rays, trapping
These are two distinct but vital functions of the atmosphere. The ozone layer acts as a shield against damaging high-energy ultraviolet (UV) radiation. The greenhouse effect, on the other hand, traps outgoing infrared radiation (heat), keeping the planet warm enough for life.

50. The Paris Agreement is a global accord that aims to _____.
(A) Ban the use of all plastics
(B) Limit global warming by reducing greenhouse gas emissions
(C) Protect the ozone layer by phasing out CFCs
(D) Create more national parks around the world

Ans :

(B) Limit global warming by reducing greenhouse gas emissions
The Paris Agreement is a landmark international treaty on climate change. Its central goal is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels.

51. Genes are to instructions as a zygote is to a(n) _____.
(A) Adult organism
(B) Parent cell
(C) Single-celled starting point
(D) Gamete

Ans :

(C) Single-celled starting point
Genes are the "instruction manual" for building an organism. A zygote is the very first cell of a new multicellular organism, formed by the fusion of gametes, which contains this complete set of instructions.

Downloaded from www.pdf.tube

Ans :

(C) In the Crust
The crust is the outermost, solid layer of the Earth. It is this relatively thin layer that contains all the planet's landforms, water bodies and the entire biosphere.

64. In birds, the development of the zygote into an embryo happens _____ the body, while in most mammals, it happens _____ the body.
(A) Inside, outside
(B) Near, far from
(C) Below, above
(D) Outside, inside

Ans :

(D) Outside, inside
This question contrasts two major reproductive strategies. Birds lay eggs, so the embryo develops outside the mother's body. Most mammals have internal gestation, where the embryo develops to a much later stage inside the mother's body before birth.

65. Which of the following is an INCORRECT pairing of a life sphere and its main component?
(A) Geosphere - Air
(B) Hydrosphere - Water
(C) Biosphere - Life
(D) Atmosphere - Air

Ans :

(A) Geosphere - Air
The geosphere refers to the solid parts of the Earth, including rocks, soil, and minerals. The atmosphere is the sphere that consists of air and other gases.

66. What process in single-celled organisms like bacteria and amoeba is a form of asexual reproduction?
(A) Fertilization
(B) Division into two identical individuals
(C) Pollination
(D) Germination

Ans :

(B) Division into two identical individuals
These unicellular organisms reproduce by binary fission, where the parent cell divides into two genetically identical daughter cells. This is a simple and rapid form of asexual reproduction.

67. Why is a planet's size an important factor for its ability to support life?
(A) Larger planets are always significantly warmer than smaller planets.
(B) The planet's size determines its gravity for holding an atmosphere.
(C) Smaller planets tend to rotate much faster, creating stronger winds.
(D) Only very large planets are capable of having a magnetic field.

Ans :

(B) The planet's size determines its gravity for holding an atmosphere.
Gravity is directly related to mass and size. A planet must be large enough to have a gravitational pull strong enough to retain a significant atmosphere, which is essential for respiration, temperature regulation, and protection from radiation.

68. A community decides to plant more trees, protect a local wetland, and start a recycling program. These actions collectively help to _____.
(A) Address the challenges of climate change, biodiversity loss, and pollution
(B) Increase the negative effects of the triple planetary crisis
(C) Speed up the natural loss of the protective ozone layer
(D) Reduce the overall strength of the Earth's magnetic field

Ans :

(A) Address the challenges of climate change, biodiversity loss, and pollution
Each of these actions targets one aspect of the environmental crisis. Planting trees helps with climate change, protecting a wetland preserves biodiversity, and recycling reduces waste and pollution. Together, they represent a positive response to the crisis.

69. In sexual reproduction, a zygote is formed by the fusion of two _____.
(A) Gametes
(B) Embryos
(C) Somatic cells
(D) Parents

Ans :

(A) Gametes
A zygote is the initial single cell of a new organism. It is specifically formed when two gametes (a male gamete like a sperm and a female gamete like an egg) fuse during the process of fertilization.

58. Which statement about reproduction is INCORRECT?
(A) It ensures the continuity of life.
(B) Asexual reproduction involves the fusion of two gametes.
(C) Sexual reproduction introduces genetic variation.
(D) A zygote is the first cell of a new individual in sexual reproduction.

Ans :

(B) Asexual reproduction involves the fusion of two gametes.
Asexual reproduction is defined by the absence of gamete fusion. It involves only one parent, and the new individual arises from the cells of that parent through processes like division, budding, or vegetative propagation.

59. What are the three main components of the 'triple planetary crisis'?
(A) Earthquakes, volcanoes, and tsunamis
(B) Overpopulation, poverty, and disease
(C) Climate change, biodiversity loss, and pollution
(D) Asteroid impacts, solar flares, and magnetic field shifts

Ans :

(C) Climate change, biodiversity loss, and pollution
The text explicitly identifies these three interconnected and human-driven environmental challenges climate change, the rapid loss of species and habitats, and widespread pollution of air, water, and soil as the triple planetary crisis.

60. Sperm is to male animal as _____ is to male flowering plant.
(A) Egg (B) Ovule
(C) Seed (D) Pollen

Ans :

(D) pollen
This analogy identifies the male gamete or the structure that carries it in different organisms. In animals, the sperm is the male gamete. In flowering plants, the pollen grain contains the male gametes that are transferred for fertilization.

61. The statement "everything works together in balance" on Earth refers to the _____.
(A) The complex interactions between the Earth's many spheres
(B) The fact that all animals on the planet are the same size
(C) The idea that the day and the night are of equal length
(D) The principle that all planets in the solar system are spaced evenly

Ans :

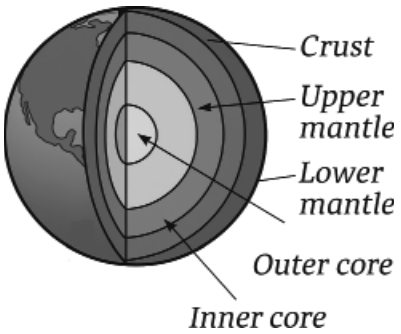
(A) The complex interactions between the Earth's many spheres
The habitability of Earth is not due to a single factor but to the intricate and balanced interplay between all its systems. The flow of energy and the cycling of materials between the living and non-living parts of the planet create a stable, self-sustaining environment.

62. A student wants to observe asexual reproduction in a simple animal. Which of the following organisms mentioned in the text would be a good example to study for its ability to regrow from a fragment of its body?
(A) A bird
(B) A Planaria (flatworm)
(C) A fish
(D) A dog

Ans :

(B) A Planaria (flatworm)
The text specifically highlights Planaria as an example of an animal with remarkable regenerative abilities, a form of asexual reproduction. A small fragment of a planarian can regrow into a complete, new individual.

63. Figure shows the layered structure of the Earth. Where are all the forests, oceans, and life forms located?



(A) In the Inner Core
(B) In the Outer Core
(C) In the Crust
(D) In the Mantle

Click Here to Buy book on Amazon

Ans :

(C) germination
Seed dispersal is the movement of seeds away from the parent plant. Germination is the process where a seed, given the right conditions (like water), begins to sprout and grow into a new plant.

40. The loss of biodiversity is a serious threat because _____.
(A) It makes ecosystems more stable and resilient
(B) Each species plays a role, and losing them can weaken an ecosystem's ability to support life
(C) It leads to the creation of more national parks
(D) It only affects the animals and not the plants

Ans :

(B) Each species plays a role, and losing them can weaken an ecosystem's ability to support life
Biodiversity contributes to the stability and health of ecosystems. Each species performs functions (like pollination, decomposition, or pest control) that are part of an intricate web. Losing species can disrupt these functions and degrade the entire system.

41. The instructions for how an organism develops, which are passed from parents to offspring, are stored in the form of _____.
(A) Genetic material or genes
(B) Proteins
(C) Carbohydrates
(D) Gametes

Ans :

(A) Genetic material or genes
Genes are segments of DNA that carry the instructions for building and maintaining an organism. This genetic material is the blueprint of life that is inherited by offspring from their parents during reproduction.

42. Organisms like bacteria and amoeba that divide to produce two identical individuals are undergoing _____.
(A) Sexual reproduction
(B) Asexual reproduction
(C) Germination
(D) Fertilization

Ans :

(B) Asexual reproduction
This method of reproduction involves a single parent cell dividing into two genetically identical daughter cells. Since there is no fusion of gametes from two different parents, it is a form of asexual reproduction.

43. In mammals, where does the development of the zygote into an embryo primarily take place?
(A) Inside an egg laid by the female.
(B) In the external environment, like in water.
(C) Inside the body of the female.
(D) Inside the body of the male.

Ans :

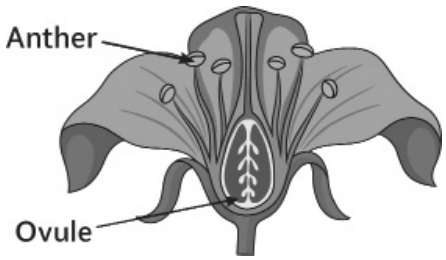
(C) Inside the body of the female.
A defining characteristic of most mammals is internal gestation. After fertilization, the zygote develops into an embryo and then a fetus within the mother's uterus, where it is protected and nourished until birth.

44. A city experiences increased smog and breathing problems among its residents. This is a direct consequence of which part of the triple planetary crisis?
(A) Biodiversity loss (B) Climate change
(C) Geodiversity (D) Pollution

Ans :

(D) Pollution
Smog and respiratory issues are direct health impacts of air pollution, which is caused by emissions from vehicles, factories, and other sources. Pollution is one of the three major interconnected environmental challenges facing the planet.

45. Figure shows a cross-section of a flower. Pollination is the process where pollen from the _____ is transferred to the female part of a flower.



(A) Anther
(B) Ovule
(C) Petal
(D) Sepal

Ans :

(A) Anther
The anther is the part of the stamen (the male reproductive organ of a flower) that contains the pollen. For reproduction to occur, this pollen must be transferred to the stigma of a pistil.

NODIA

70. What are genes?
(A) Special cells used for reproduction.
(B) Instructions, stored in every cell, that are passed from parents to offspring.
(C) The liquid part of a cell where reactions happen.
(D) A type of asexual reproduction in plants.

Ans :

(B) Instructions, stored in every cell, that are passed from parents to offspring.
Genes are the units of heredity that are transferred from a parent to offspring and are held to determine some characteristic of the offspring. They are segments of DNA that contain the instructions for building proteins and controlling traits.

71. Which statement about the Earth's atmosphere is INCORRECT?
(A) It contains oxygen needed for respiration.
(B) It helps keep the planet warm through the greenhouse effect.
(C) Its gravity is what protects us from solar winds.
(D) It contains an ozone layer that blocks harmful UV rays.

Ans :

(C) Its gravity is what protects us from solar winds.
It is the Earth's magnetic field, not its atmosphere's gravity, that acts as a shield against the solar wind. The atmosphere itself is held in place by the planet's gravity.

72. The development of antibiotic resistance in bacteria is an example of what biological process?
(A) Adaptation and evolution
(B) Asexual reproduction
(C) The greenhouse effect
(D) Geodiversity

Ans :

(A) Adaptation and evolution
When bacteria are exposed to antibiotics, those with random mutations that allow them to survive will reproduce. Over generations, this leads to a population of bacteria that has adapted to the presence of the antibiotic, which is a real-world example of evolution in action.

73. The solid parts of the Earth, including materials like rocks and minerals, are known as the _____.
(A) Hydrosphere
(B) Biosphere
(C) Atmosphere
(D) Geosphere

Ans :

(D) Geosphere
The geosphere is the collective name for the solid components of the Earth. This includes the crust, mantle, and core, as well as all the rocks, minerals, and landforms on the surface.

74. Apple skin is to the whole apple as Earth's crust is to the _____.
(A) Sun (B) Whole Earth
(C) Atmosphere (D) Moon

Ans :

(B) Whole Earth
The chapter uses this analogy to provide a sense of scale. The apple skin is a very thin layer compared to the entire apple. Similarly, the Earth's crust, where all life resides, is a proportionally very thin layer compared to the entire planet.

75. A key reason sexual reproduction is important for the long-term survival of a species is that it _____.
(A) Is much faster and more efficient than asexual reproduction
(B) Produces offspring identical to the parents, preserving traits
(C) Creates genetic variation, allowing for adaptation
(D) Requires much less energy than asexual reproduction

Ans :

(C) Creates genetic variation, allowing for adaptation
By mixing genes from two parents, sexual reproduction generates diversity in a population. This variation is the raw material for natural selection, allowing a species to adapt over generations if its environment changes.

76. The transfer of pollen from the male part of a flower to the female part is called _____.
(A) Pollination
(B) Germination
(C) Fertilization
(D) Propagation

Ans :

(A) Pollination

NODIA

Pollination is the crucial first step in the sexual reproduction of flowering plants. It is the act of moving pollen grains from the anther (male part) to the stigma (female part), which can then lead to fertilization.

77. Which of the following is NOT a consequence of climate change?
(A) Melting of ice caps and glaciers.
(B) Rise in global sea levels.
(C) More frequent extreme weather events.
(D) An increase in the strength of the ozone layer.

Ans :

(D) An increase in the strength of the ozone layer.
Climate change and ozone depletion are separate, though related, issues. Global warming does not strengthen the ozone layer; in fact, some complex chemical interactions can be affected. The recovery of the ozone layer is due to the reduction of CFCs, not climate change.

78. Why can't plants start growing on Mars just by adding soil and water?
(A) Mars does not have any gravity to hold plants down.
(B) Mars is too far from the Sun for any light to reach it.
(C) Mars lacks a thick atmosphere, has extreme temperatures, and no magnetic field.
(D) The soil that is found on the surface of Mars is poisonous to all life.

Ans :

(C) Mars lacks a thick atmosphere, has extreme temperatures, and no magnetic field.
Life requires a complex system of suitable conditions. Mars's thin atmosphere, extreme cold, and lack of a protective magnetic field make it inhospitable for Earth plants, even if soil and water were provided.

79. If a new planet is discovered that is the same size as Earth and has a similar atmosphere, but orbits much farther from its star, what is a likely reason it would not support life?
(A) Its gravitational pull would be much too strong for any life.
(B) It would be too cold, and all of its water would be frozen.
(C) It would not have any kind of protective magnetic field.
(D) Its atmosphere would be much too thin to support life.

Ans :

(B) It would be too cold, and all of its water would be frozen.
Being much farther from its star means the planet would receive significantly less energy. It would likely be outside the habitable zone, with temperatures far below the freezing point of water, making liquid water and life as we know it impossible.

80. An animal lays eggs in the water, and the male releases sperm over them. The zygote develops into an embryo externally. This describes the reproductive strategy of a _____.
(A) Frog
(B) Bird
(C) Human
(D) Snake

Ans :

(A) Frog
This is a classic example of external fertilization, common in many aquatic animals. Frogs and fish exhibit this behavior, releasing their gametes into the water where fertilization and subsequent development occur without any internal gestation or parental care of the embryo.

81. What is biodiversity?
(A) The variety of different types of landforms in a region.
(B) The total number of organisms in a population.
(C) The interaction between living and non-living things.
(D) The variety of different species and life forms in an ecosystem.

Ans :

(D) The variety of different species and life forms in an ecosystem.
Biodiversity refers to the variety and variability of life on Earth. It encompasses the diversity of species, the genetic diversity within those species, and the diversity of the ecosystems they form.

82. The fact that calves grow into cows and kittens grow into cats is ensured by the _____.
(A) Type of food they eat
(B) Environment they grow up in
(C) Specific genetic instructions passed from parents to offspring
(D) Process of asexual reproduction

Ans :

Downloaded from www.pdf.tube

(C) Specific genetic instructions passed from parents to offspring

Every species has a unique set of genetic instructions (genes) that act as a blueprint for development. These instructions are passed down through reproduction, ensuring that offspring develop into the same type of organism as their parents.

Download INDIA's Best Study app NODIA

MATCHING TYPE QUESTIONS

83. Match the unique features of Earth that make it habitable with their correct descriptions.

	Column A		Column B
1	Habitable Zone	A	A protective shield created by the planet's core that deflects harmful solar winds and cosmic rays from space.
2	Atmosphere	B	A layer of gases providing oxygen and an ozone layer that blocks UV rays.
3	Magnetic Field	C	Considered essential for life as we know it to evolve and thrive.
4	Liquid Water	D	The "Goldilocks" region around a star where temperatures are right for liquid water.

Options

(a) 1-B, 2-D, 3-C, 4-A
(b) 1-A, 2-C, 3-D, 4-B
(c) 1-D, 2-B, 3-A, 4-C
(d) 1-C, 2-A, 3-B, 4-D

Ans :

(c) 1-D, 2-B, 3-A, 4-C

The habitable zone is the correct distance from a star for liquid water. The atmosphere provides essential gases and protection. Earth's magnetic field acts as a shield against harmful space radiation. The presence of liquid water is crucial for life as we know it.

84. Match the Earth's major systems (spheres) with what they consist of.

	Column A		Column B
1	Atmosphere	A	All the water on Earth's surface, such as oceans, lakes, and rivers.
2	Hydrosphere	B	All living things and the places they live, including land, water, and air.
3	Geosphere	C	The layer of gases that surrounds the planet.
4	Biosphere	D	The solid parts of the Earth, including rocks, soil, and minerals.

Options

(a) 1-C, 2-A, 3-D, 4-B
(b) 1-B, 2-D, 3-A, 4-C
(c) 1-D, 2-C, 3-B, 4-A
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(a) 1-C, 2-A, 3-D, 4-B

The atmosphere is the air around us. The hydrosphere is all the water on Earth. The geosphere consists of the solid land, rocks, and soil. The biosphere is the part of Earth where all life exists.

85. Match the type of reproduction with its correct characteristic.

	Column A		Column B
1	Asexual Reproduction	A	A method of asexual reproduction in plants where a new plant grows from a part like a stem or a leaf.
2	Sexual Reproduction	B	Involves a single parent producing offspring that are exact copies of itself.
3	Gametes	C	Specialized cells like sperm and egg that carry half of the parent's genetic material and combine during fertilization.
4	Vegetative Propagation	D	Involves two parents and leads to offspring with a unique mix of genetic traits from both.

NODIA

126. What are gametes, and what is their role in sexual reproduction?

Ans :

Gametes are specialized reproductive cells, like sperm and eggs, that carry half of a parent's genetic material to form a new, unique offspring.

127. Name the two processes that combine to form a zygote in flowering plants.

Ans :

The two processes are pollination, where pollen is transferred, and fertilization, where male and female gametes combine to create the zygote.

128. What two primary greenhouse gases are released by burning fossil fuels?

Ans :

Burning fossil fuels such as coal and oil releases significant amounts of greenhouse gases, primarily carbon dioxide and methane, into the atmosphere.

129. What is the hydrosphere?

Ans :

The hydrosphere is the combined mass of water found on, under, and above the surface of a planet, including ponds, lakes, rivers, and oceans.

130. What is the key difference between asexual and sexual reproduction regarding offspring?

Ans :

In asexual reproduction, offspring are exact copies of the single parent, whereas in sexual reproduction, offspring have a unique mix of traits from both parents.

131. What happens during fertilization in animals?

Ans :

Fertilization is the process where male and female gametes, sperm and egg respectively, join together to form a new cell called a zygote.

132. Besides providing oxygen, what is another crucial role of Earth's atmosphere?

Ans :

Besides providing oxygen for respiration, the atmosphere traps heat through the greenhouse effect, which keeps the planet warm enough for liquid water to exist.

Download INDIA's Best Study app NODIA

133. Explain why life is found only on the thin crust of the Earth.

Ans :

Life exists on the thin crust because it provides the necessary combination of liquid water, a breathable atmosphere, and stable temperatures suitable for survival.

134. How does reproduction ensure the continuity of life on Earth?

Ans :

Reproduction ensures the continuity of life by allowing organisms to create new individuals, passing down genetic instructions and maintaining the existence of their species.

135. Compare the atmospheres of Earth and Mars in terms of thickness.

Ans :

Earth has a relatively thick atmosphere that supports life, whereas the atmosphere on Mars is extremely thin, being about 100 times thinner than on Earth.

136. Why are international agreements like the Paris Agreement important for the planet?

Ans :

Agreements like the Paris Agreement are important because they commit countries to work together to reduce greenhouse gas emissions and limit global warming.

137. How can small changes in the environment, like pollution, have large impacts?

Ans :

Because all parts of an ecosystem are interconnected, a small change like pollution can disrupt the balance, affecting water quality, habitats, and multiple species.

138. Why don't brothers and sisters from the same parents look exactly alike?

Ans :

Siblings look different because each child receives a unique and random combination of genes from both parents, resulting in a different mix of traits.

139. How does a plant greenhouse trap heat differently than the planetary greenhouse effect?

Ans :

Click Here to Buy book on Amazon

water to exist in liquid form, a key condition for life.

89. All life on Earth is found on the crust, which is a very thin layer compared to the planet's total size.

Ans :

True
From the tallest mountain to the deepest ocean, all of life exists on the crust, a layer as thin as an apple's skin relative to the Earth's size.

90. Venus is the hottest planet in our solar system primarily because it is the closest one to the Sun.

Ans :

False
Venus is the hottest planet because its thick atmosphere is almost entirely carbon dioxide, which traps heat through a powerful greenhouse effect.

91. Earth's magnetic field acts as a protective shield, deflecting harmful high-energy particles from space.

Ans :

True
The Earth's magnetic field pushes away many harmful particles from the sun and space, which keeps our atmosphere and the life on our planet safe.

92. In asexual reproduction, genetic material from two parents is combined to create a new individual.

Ans :

False
Asexual reproduction involves a single parent producing new individuals that are exact copies of itself.

93. The ozone layer is a part of our atmosphere that protects life by blocking harmful ultraviolet (UV) rays from the Sun.

Ans :

True
The ozone layer acts like a shield, blocking harmful UV rays that can damage living cells.

94. The "triple planetary crisis" facing Earth consists of climate change, biodiversity loss, and pollution.

Ans :

True
The biggest environmental challenges that we face today are climate change, biodiversity loss, and pollution, which are known together as the triple planetary crisis.

95. The greenhouse effect on Earth is entirely harmful to life.

Ans :

False
The greenhouse effect plays a crucial role in maintaining a suitable temperature on Earth by trapping some heat, which allows water to remain in its liquid state.

96. Sexual reproduction creates genetic variation because the offspring inherit a unique combination of genes from both parents.

Ans :

True
In sexual reproduction, instructions from two parents combine, creating offspring that are not exactly like either parent and allowing for new traits to appear.

NODIA

97. If Earth were a much smaller planet, its stronger gravity would hold a thicker atmosphere.

Ans :

False
If Earth were much smaller, its gravity would be too weak to hold on to the gases in our atmosphere, and they would likely escape into space.

98. The geosphere is the part of the Earth that includes all living beings.

Ans :

False
The geosphere is made up of the solid parts of the Earth, like rocks and soil. All living beings make up the biosphere.

99. Reproduction is the process that ensures the continuity of life on Earth.

Ans :

True If plants and animals did not reproduce, life would eventually disappear. Reproduction ensures that each type of organism continues to exist.

100. Gametes are specialized reproductive cells that carry the complete genetic material of a single parent.

The triple planetary crisis includes the following interconnected environmental issues:

- **Climate Change** : Caused by the release of greenhouse gases like carbon dioxide from burning fossil fuels, leading to global warming and extreme weather.
- **Biodiversity Loss** : The destruction of natural habitats for human development causes plants and animals to disappear, disrupting ecosystems.
- **Pollution** : The contamination of air, water, and soil from industrial waste, agricultural chemicals, and plastics, which harms both nature and human health.

148. Explain how Earth's size is a critical factor for its habitability.

Ans :

Earth's size is 'just right' for sustaining life. Its mass creates a gravitational pull strong enough to retain its atmosphere, preventing essential gases like oxygen from escaping into space. If it were much smaller, its weak gravity would lose the atmosphere, like Mars. If it were too large, its stronger gravity could crush living organisms under their own weight.

149. How do living and non-living things interact to sustain life on Earth?

Ans :

The interactions between living (biotic) and non-living (abiotic) components are essential for life. Abiotic elements like sunlight, water, and air enable life processes such as photosynthesis and respiration. In return, biotic elements like plants release oxygen, regulate temperature, and create nutrients in the soil through decomposition. This interdependent relationship creates a balanced, self-sustaining system where life can thrive.

150. Describe the difference between sexual and asexual reproduction regarding genetic diversity.

Ans :

Asexual and sexual reproduction produce vastly different outcomes for genetic diversity.

- **Asexual Reproduction** : Involves a single parent and produces offspring that are genetically identical clones. This method does not introduce new genetic combinations.
- **Sexual Reproduction** : Involves two parents whose genetic material combines. This mixing creates unique offspring with a new set of genes, driving genetic diversity and allowing species to adapt to changing environments.

151. The table compares asexual and sexual reproduction. Based on the genetic outcome, explain why sexual reproduction is considered more advantageous for the long-term survival and adaptation of a species.

Feature	**Asexual Reproduction**	**Sexual Reproduction**
Number of Parents	One	Two
Genetic Makeup of Offspring	Identical to parent	A mix from both parents (variation)
Example	Vegetative propagation in potatoes	Humans, flowering plants

Ans :

Sexual reproduction creates offspring with a unique mix of genes from two parents, leading to genetic variation. This variation is advantageous because it increases the chances that some individuals will have traits better suited to survive environmental changes, helping the species adapt over time.

152. How does Earth's magnetic field contribute to sustaining the atmosphere and life?

Ans :

Earth's magnetic field acts as a vital protective shield against constant streams of high-energy particles from space, known as cosmic rays and solar wind. By deflecting these harmful particles, the magnetic field prevents them from stripping away our atmosphere, depleting the ozone layer, and damaging living cells. This protection is crucial for maintaining a stable environment where life can exist.

153. What is vegetative propagation and provide two examples of plants that use it.

Ans :

Vegetative propagation is a type of asexual reproduction in which new plants grow from a part of a parent plant, rather than from seeds. These new individuals are genetically identical to the parent. This method allows for rapid multiplication without the need for pollination or fertilization. Examples include growing a new

Downloaded from www.pdf.tube

The geosphere refers to all the solid parts of the Earth, which includes all rocks, soils, and minerals that make up the planet's crust.

113. Explain why Venus is hotter than Mercury, despite being farther from the Sun.

Ans :

Venus is hotter due to its thick carbon dioxide atmosphere, which creates an intense greenhouse effect that traps far more heat than Mercury's thin atmosphere.

114. Why would it be impossible for plants to grow on Mars without significant intervention?

Ans :

Plants could not grow on Mars because it lacks a thick atmosphere, liquid water, and the soil conditions necessary to support complex life.

115. How does Earth's nearly circular orbit contribute to its stable climate?

Ans :

The Earth's nearly circular orbit keeps its distance from the sun relatively constant, ensuring it receives steady sunlight and heat throughout the year.

Download INDIA's Best Study app NODIA

116. Compare the development of a bird embryo to a mammal embryo after fertilization.

Ans :

A bird's embryo develops outside the mother's body within a laid egg, while a mammal's embryo develops inside the mother's body, receiving direct nourishment.

117. Explain the role of Earth's magnetic field in protecting our planet.

Ans :

Earth's magnetic field acts as a protective shield by deflecting harmful high-energy particles like solar wind and cosmic rays away from the planet.

118. How does cutting down a forest impact local biodiversity and climate?

Ans :

Cutting down a forest destroys habitats, leading to biodiversity loss, and can also impact local rainfall, soil quality, and air quality.

119. Distinguish between the hydrosphere and the geosphere on Earth.

Ans :

The hydrosphere comprises all water on Earth, including oceans and rivers, while the geosphere consists of the planet's solid parts like rocks and soil.

NODIA

120. Why is sexual reproduction important for the adaptation and evolution of species?

Ans :

Sexual reproduction creates genetic variation by mixing instructions from two parents, allowing for new traits that can help species adapt and survive changing environments.

121. Analyze why a very small planet is unlikely to retain an atmosphere.

Ans :

A very small planet would have weak gravity, making it unable to hold onto the gas molecules of an atmosphere, which would escape into space.

122. How do decomposers like bacteria and fungi contribute to the ecosystem?

Ans :

Decomposers break down dead organic matter, returning essential nutrients like nitrogen and potassium to the soil, which plants then use to grow.

123. What are the four planets in our solar system that are small and rocky?

Ans :

The four planets in our solar system that are categorized as relatively small and rocky are Mercury, Venus, Earth, and Mars.

124. What is the source of Earth's magnetic field, according to current scientific belief?

Ans :

It is believed that the Earth's magnetic field originates from the movement of molten iron within the planet's outer core.

125. What is vegetative propagation in plants?

Ans :

Vegetative propagation is a form of asexual reproduction where a new plant grows from a part of the parent plant, such as a leaf, stem, or root.

Options
(a) 1-B, 2-D, 3-C, 4-A
(b) 1-D, 2-B, 3-A, 4-C
(c) 1-A, 2-C, 3-D, 4-B
(d) 1-C, 2-A, 3-B, 4-D

Ans :

(a) 1-B, 2-D, 3-C, 4-A
Asexual reproduction involves one parent creating identical offspring. Sexual reproduction involves two parents, resulting in varied offspring. Gametes are the reproductive cells used in this process. Vegetative propagation is a specific type of asexual reproduction in plants.

86. Match the environmental threat with its description.

	Column A		Column B
1	Climate Change	A	The natural process of trapping heat in the atmosphere, which is intensified by human activities.
2	Biodiversity Loss	B	The contamination of air, water, and soil with harmful substances from factories, vehicles, and waste.
3	Pollution	C	The long-term changes in temperature and weather patterns, primarily due to global warming.
4	Greenhouse Effect	D	The disappearance of plant and animal species when their natural habitats are destroyed, which weakens ecosystems.

Options
(a) 1-D, 2-A, 3-C, 4-B
(b) 1-A, 2-B, 3-D, 4-C
(c) 1-B, 2-C, 3-A, 4-D
(d) 1-C, 2-D, 3-B, 4-A

Ans :

(d) 1-C, 2-D, 3-B, 4-A
Climate change refers to long-term shifts in weather patterns due to global warming. Biodiversity loss is the extinction of species, which disrupts ecosystems. Pollution is the introduction of harmful materials into the environment. The greenhouse effect is the natural warming of the planet.

87. Match the key term related to reproduction and life with its definition.

	Column A		Column B
1	Genes	A	The single cell formed when a male gamete and a female gamete combine.
2	Fertilization	B	The detailed instructions stored inside every cell that determine an organism's traits.
3	Zygote	C	The process where male and female reproductive cells (gametes) join to form a new cell.
4	Ozone Layer	D	A part of the atmosphere that acts as a shield, blocking harmful ultraviolet (UV) radiation from the Sun.

Options
(a) 1-C, 2-D, 3-A, 4-B
(b) 1-B, 2-C, 3-A, 4-D
(c) 1-D, 2-A, 3-B, 4-C
(d) 1-A, 2-B, 3-C, 4-D

Ans :

(b) 1-B, 2-C, 3-A, 4-D
Genes are the instructional units passed from parent to offspring. Fertilization is the fusion of male and female gametes. This fusion results in the formation of a zygote. The ozone layer is a crucial part of the atmosphere that protects life from UV rays.

TRUE AND FALSE

88. The "habitable zone" is the area around a star where temperatures are too hot for liquid water to exist.

Ans :

False
The habitable zone, or 'Goldilocks zone', is the region where the temperature is just right to allow

Click Here to Buy book on Amazon

A plant greenhouse traps warmed air inside a closed space, while the planetary greenhouse effect involves atmospheric gases absorbing radiation from the planet's surface.

140. Explain how the development of humps in camels is an example of adaptation.

Ans :

Camels evolved humps to store fat, which provides energy and allows them to survive for long periods in deserts with scarce food and water.

Download INDIA's Best Study app NODIA

141. Why is preserving clean air, water, and soil essential for Earth's future?

Ans :

These resources are essential because all life depends on them; protecting them maintains the delicate balance that keeps our planet healthy and habitable.

142. Analyze the relationship between seed dispersal and animals eating fruit.

Ans :

When animals eat fruit and travel, they drop the seeds in new locations through their waste, helping plants spread and grow in new areas.

SHORT ANSWER QUESTIONS

143. Describe the key characteristics that make Earth uniquely capable of supporting life.

Ans :

Earth's ability to support life stems from its ideal position in the solar system's habitable zone, which allows for liquid water. Its size provides enough gravity to hold a vital atmosphere containing oxygen and an ozone layer. Furthermore, its protective magnetic field shields the planet from harmful solar radiation, creating a stable environment where life can thrive.

144. The table provides data on Earth and its neighbouring planets. Based on this information, state two reasons why Earth is uniquely capable of supporting life while Venus and Mars are not.

Planet	Average Temperature (°C)	Radius (Compared to Earth)	Has an Atmosphere?
Venus	450	0.95	Yes (Thick)
Earth	15	1.00	Yes (Just right)
Mars	-60	0.53	Yes (Thin)

Ans :

Earth's average temperature of 15°C allows water to exist as a liquid, which is essential for life. Venus is too hot, and Mars is too cold. Additionally, Earth's atmosphere has the right thickness and composition to support life, unlike the crushing, hot atmosphere of Venus or the thin, cold one on Mars.

145. Explain the process of sexual reproduction in flowering plants from pollination to seed formation.

Ans :

The key stages in the sexual reproduction of flowering plants are:

- **Pollination** : Pollen grains, the male gametes, are transferred from a flower's anther to another flower, often by wind or insects.
- **Fertilization** : The male gamete from the pollen combines with the female gamete, the ovule, found deep inside the flower.
- **Zygote Formation** : This fusion creates a single cell called a zygote, which contains genetic material from both parents.
- **Seed Development** : The zygote develops into an embryo, which becomes the seed, ready to grow into a new plant.

146. What is the greenhouse effect, and how does it maintain Earth's temperature?

Ans :

The greenhouse effect is a natural process where certain gases in the atmosphere, like carbon dioxide, trap heat. Sunlight warms the Earth's surface, which then radiates heat back. Greenhouse gases absorb this outgoing radiation, preventing it from escaping into space. This mild effect keeps Earth's average temperature stable and high enough for water to remain liquid, which is essential for life.

147. Describe the main components of the 'triple planetary crisis' and their causes.

Ans :

Downloaded from www.pdf.tube

BETTER THAN BOOK IN THE MARKET

Why students are choosing this book 👉

School teachers already use this content to set papers.

Still not sure?

- 👉 Match this PDF with your question papers
- 👉 See the similarity yourself

Why does this happen?

- ✓ Teachers have its PDF & Word files
- ✓ Easy access
- ✓ Direct copy-paste questions
- ✓ Same pattern followed

Don't miss out—get the advantage today!

Ans :

Our solar system's planets are categorized into two distinct groups:

- **Rocky Planets** : These are relatively small, dense planets located closer to the Sun. They include Mercury, Venus, Earth, and Mars.
- **Gas Giants** : These are large planets located farther from the Sun and are composed mostly of gases. They include Jupiter, Saturn, Uranus, and Neptune.

162. Explain the importance of the Earth's atmosphere for life.

Ans :

The Earth's atmosphere is vital for life for several key reasons. It contains oxygen, which is essential for the respiration of almost all living forms. It also includes an ozone layer that acts as a shield against the Sun's harmful ultraviolet rays. Furthermore, the atmosphere traps heat via the greenhouse effect, maintaining a temperature range that allows for the existence of liquid water.

163. Describe how the loss of a single species can affect an entire ecosystem.

Ans :

In an ecosystem, every species has a role and is interconnected through a food web. For example, if a herbivore species like deer disappears, the predators that feed on them, such as tigers, lose a major food source and may struggle to survive. This demonstrates that losing even one species can weaken the entire ecosystem's ability to support life by disrupting these interdependent relationships.

164. What are genes, and how do they ensure a calf grows into a cow?

Ans :

Genes are units of genetic material stored in every cell, acting as a complete instruction manual for an organism. They contain specific instructions for all biological processes. For a calf, different genes guide the formation of bones, muscles, skin, and other features, ensuring that it develops according to the specific blueprint of a cow and not another animal.

165. The table below shows a cause-and-effect chain starting with a human activity. Explain how the single action of deforestation can lead to both climate change and a loss of biodiversity.

Human Activity	Direct Effect	Consequence 1	Consequence 2
Deforestation	Fewer trees to absorb CO_2	Increased greenhouse gases in the atmosphere	Climate Change
Deforestation	Destruction of natural habitats	Animals lose food and shelter	Biodiversity Los

Ans :

Deforestation leads to climate change because fewer trees are available to absorb carbon dioxide, a greenhouse gas, causing the planet to warm up. It also causes biodiversity loss by destroying the habitats that countless plants and animals rely on for food, shelter, and survival.

166. How does water pollution from factories and farms threaten aquatic ecosystems?

Ans :

Water pollution poses a severe threat to aquatic life.

- **Industrial Waste** : Chemicals and toxins from factories can directly poison aquatic organisms and accumulate in the food chain.
- **Agricultural Runoff** : Excess fertilizers from farms can cause algal blooms that deplete oxygen in the water, suffocating fish and other life.
- **Plastics** : Plastic waste can entangle or be ingested by animals, causing injury or death, and it breaks down into harmful microplastics.

167. What are cosmic rays and solar wind, and how does Earth defend against them?

NODIA

Ans :

Cosmic rays are high-energy particles originating from deep space, while the solar wind is a stream of charged particles released from the Sun. Both can be harmful to life and the atmosphere. Earth's primary defense is its magnetic field, which acts as a shield, deflecting the majority of these damaging particles away from our planet and keeping life safe.

168. Explain the life cycle of a flowering plant involving fruit and animal interaction.

Ans :

In flowering plants, after fertilization, the ovule develops into a seed. The fleshy part of the flower surrounding the ovule grows into a fruit, which

money plant from a stem cutting or sprouting a potato from its 'eyes'.

154. Explain why international environmental agreements are established and give one example.

Ans :

International environmental agreements are created because global problems like climate change and ozone depletion affect all countries and require coordinated action. An example is the Montreal Protocol (1987), which successfully united nations to phase out harmful chemicals like CFCs that were destroying the ozone layer. This global cooperation has allowed the protective ozone layer to begin its slow recovery.

155. How does the process of sexual reproduction in animals differ between fish and mammals?

Ans :

The primary differences in their reproductive strategies are:

- **Fertilization** : In most fish, fertilization is external, with sperm and eggs combining in the water. In mammals, fertilization is internal, occurring inside the female's body.
- **Embryo Development** : Fish embryos typically develop externally within eggs laid in the water. Mammalian embryos develop inside the mother's body, receiving continuous nourishment and protection until birth.

156. Why is liquid water considered essential for life to evolve and be sustained?

Ans :

Liquid water is crucial for life because it is a universal solvent, capable of dissolving nutrients for organisms to absorb and transporting them within cells. It facilitates the chemical reactions necessary for metabolism and other life processes. Planets without liquid water, where it is either all ice or all vapor, are considered inhospitable for the development and sustenance of most life forms.

157. The table describes the conditions on three newly discovered planets orbiting a star similar to our Sun. Which of these planets is located in the 'habitable zone'? Justify your answer.

Planet	**Distance from Star**	**Dominant State of Water on Surface**
Xylos	Close	Vapour (too hot)
Yarrow	Medium	Liquid (just right)
Zenn	Far	Ice (too cold)

Ans :

Planet Yarrow is in the habitable zone. This zone is defined as the region around a star where the temperature is just right for water to exist in its liquid form. Liquid water is considered essential for life as we know it to develop and thrive.

158. Describe how the geosphere and biosphere interact to create fertile soil.

Ans :

The creation of fertile soil is a perfect example of geosphere-biosphere interaction. The geosphere provides the base material through the slow breakdown of rocks. The biosphere contributes by adding organic matter from the remains of dead plants and animals. Microorganisms in the soil then decompose this matter, releasing vital nutrients like nitrogen and potassium that plants need to grow.

159. How do human activities like burning fossil fuels disrupt Earth's natural carbon balance?

Ans :

Naturally, Earth maintains a carbon balance as plants and oceans absorb carbon dioxide from the atmosphere. However, burning fossil fuels releases vast amounts of extra carbon that was locked underground for millions of years. This rapid release overwhelms the Earth's capacity to absorb it, leading to a buildup of CO_2 in the atmosphere, which intensifies the greenhouse effect and causes global warming.

160. Why are offspring from sexual reproduction not identical to either of their parents?

Ans :

Offspring from sexual reproduction inherit a unique mix of genetic information from two parents. Each parent contributes specialized reproductive cells called gametes, which contain only half of their genetic material. When these gametes combine, they form a new individual with a complete but novel set of instructions, resulting in a combination of traits from both parents but identical to neither.

161. What are the rocky planets and gas giants in our solar system?

Click Here to Buy book on Amazon

Ans :

False
Gametes, such as sperm and eggs, are reproductive cells that carry only half of a parent's genetic material.

101. Global warming is primarily caused by an increase in greenhouse gases, like carbon dioxide, from human activities such as burning fossil fuels.

Ans :

True
Burning fossil fuels releases extra greenhouse gases that have been locked underground, causing the Earth's temperature to rise.

102. All planets in our solar system have a thick, oxygen-rich atmosphere just like Earth's.

Ans :

False
Planetary atmospheres vary greatly; for example, Mars's atmosphere is 100 times thinner than Earth's, and Mercury has no atmosphere at all.

VERY SHORT QUESTIONS

103. What is the primary condition that defines the 'habitable zone' around a star?

Ans :

The habitable zone is the specific range of distances from a star where the temperature is just right, allowing water to exist in liquid form.

104. How thick is the Earth's crust where life exists compared to the planet's total size?

Ans :

If Earth were the size of an apple, the crust, which supports all life, would be as incredibly thin as the apple's skin.

105. What is the main component of Venus's atmosphere that causes its extreme heat?

Ans :

The air on Venus is almost entirely made up of carbon dioxide gas, which traps heat and prevents it from escaping into space.

106. What are the two main types of reproduction essential for the continuity of life?

Ans :

The two primary types of reproduction that ensure life continues are asexual reproduction, involving a single parent, and sexual reproduction, involving two parents.

107. Define the term 'biosphere' in the context of Earth's systems.

Ans :

The biosphere consists of all living beings, including plants, animals, and microbes, along with the places where they live and interact with their surroundings.

Download INDIA's Best Study app NODIA

108. What is the primary function of the Earth's ozone layer for living organisms?

Ans :

The ozone layer acts as a crucial protective shield, blocking harmful ultraviolet (UV) rays from the sun that can damage living cells.

109. What is the 'triple planetary crisis' threatening life on Earth today?

Ans :

The triple planetary crisis refers to the three biggest environmental challenges faced today : climate change, biodiversity loss, and widespread pollution.

110. What is asexual reproduction, and how many parents are involved?

NODIA

Ans :

Asexual reproduction is a process where a single parent produces new individuals that are genetically exact copies of itself without any genetic mixing.

111. What are genes, and what function do they serve in a living being?

Ans :

Genes are the genetic material stored inside every cell, acting as a detailed instruction manual that guides the development and functions of the organism.

112. Define the term 'geosphere' as one of Earth's major systems.

Ans :

serves to protect the seed and aid in its dispersal. Animals are attracted to the fruit for food. After eating it, they often travel to new locations and excrete the seeds, effectively planting them far from the parent plant.

169. What is the difference in providing nutrition to embryos in birds versus mammals?

Ans :

Birds and mammals have different strategies for nourishing their developing young.

- **Birds (Oviparous)** : The female lays an egg that contains all the necessary nutrients (yolk) to sustain the embryo until it hatches. Nutrition is pre-packaged.
- **Mammals (Viviparous)** : The embryo develops inside the mother's body. It receives a continuous supply of food and oxygen directly from the mother through the placenta until it is born.

170. Describe the role of the atmosphere and hydrosphere in shaping weather and supporting life.

Ans :

The atmosphere and hydrosphere work together to create climate conditions that support life. The sun heats water in the hydrosphere, causing evaporation. This water vapor rises into the atmosphere, forms clouds, and eventually returns as rain or snow. This water cycle refills freshwater sources like rivers and lakes, determines the types of plants and animals in a region and supports global agriculture.

171. How can simple, individual actions help combat the triple planetary crisis?

Ans :

Individual actions, when performed collectively, can make a significant impact. Reusing, repairing, and recycling items, especially clothes and plastics, directly reduces waste and pollution. Conserving energy by turning off lights and using water wisely helps decrease the demand for fossil fuels. These small, responsible choices contribute to a larger effort to protect the planet's health for the future.

172. The table lists some of the unique features that make Earth a life-sustaining planet. Explain the protective role of Earth's magnetic field in maintaining life.

Feature	Description
Atmosphere	Contains oxygen for breathing and ozone to block UV rays.
Liquid Water	Essential for all known life forms.
Magnetic Field	Shields the planet from harmful space radiation.

Ans :

The Earth's magnetic field acts as a protective shield, deflecting harmful, high-energy particles from the Sun (solar wind) and space (cosmic rays). Without this shield, these particles could damage our atmosphere, including the ozone layer, and expose life on the surface to dangerous radiation.

173. What is geodiversity and how does it support a wide variety of life?

Ans :

Geodiversity refers to the variety of non-living natural features, including different landforms like mountains and valleys, as well as various types of rocks and soils. This diversity is crucial because it creates a wide range of unique habitats. Each distinct habitat, with its specific conditions, can then support different types of plants and animals, thereby promoting overall biodiversity on the planet.

174. Explain how water acts as a critical substance for both plants and animals.

Ans :

Water is essential for the life processes of both plants and animals.

- **In Plants** : Water is a key reactant in photosynthesis and acts as a transport medium, carrying dissolved nutrients from the soil up to the leaves.
- **In Animals** : It regulates body temperature through processes like sweating, aids in the digestion of food, and ensures proper hydration, which is vital for all cellular functions and overall health.

175. Why is a balance between different parts of an ecosystem so important?

Ans :

Ecosystem balance is crucial because all components land, air, water and living things are

Downloaded from www.pdf.tube

3. It is an exact copy (genetically identical). In asexual reproduction, a single parent produces new individuals that are exact copies of itself in terms of the instructions inside the cell.

191. A bee visits a flower to collect nectar. As it does, pollen grains, the male gametes, from the flower's anther stick to its body. The bee then flies to another flower, transferring the pollen. This process, called pollination, is the first step in sexual reproduction for flowering plants, which eventually leads to fertilization and the formation of a seed.

Questions:

1. In a flower, what are the male gametes called?
2. What is the process of transferring pollen from one flower to another called?
3. After pollination and fertilization, the ovule develops into a seed. What does the fleshy part of the flower around the ovule develop into?

Ans :

1. The male gametes are the pollen grains.
2. The process is called pollination.
3. The fleshy part of the flower around the ovule develops into a fruit.

192. A news report discusses the "triple planetary crisis" facing Earth. It explains this includes climate change caused by burning fossil fuels, biodiversity loss from destroying natural habitats, and pollution of our air, water, and soil. These three interconnected challenges are disrupting the delicate balance of Earth's systems and threatening the future of life on our planet.

Questions:

1. What are the three environmental challenges that make up the "triple planetary crisis"?
2. What human activity is a major cause of climate change mentioned in the text?
3. Explain how the loss of biodiversity (e.g., grasses vanishing) can affect other organisms in the ecosystem.

Ans :

1. The three challenges are climate change, biodiversity loss, and pollution.
2. Burning fossil fuels like coal and oil is a major cause of climate change.
3. If grasses vanish, herbivores like deer struggle to survive. Without these herbivores, predators like tigers lose their food source. This shows how losing even a few species weakens nature's ability to support life.

193. The Earth's size is just right to support an atmosphere. If Earth were much smaller, its gravity would have been too weak to hold on to the gases, and they would have escaped into space, like on Mars or Mercury. If it were too large with much stronger gravity, life forms could be crushed by their own weight.

Questions:

1. What would happen to Earth's atmosphere if the planet were much smaller?
2. Why is having an atmosphere essential for life as we know it?
3. The atmosphere on Mars is 100 times thinner than on Earth. How does this relate to the concept of a planet's size and gravity?

Ans :

1. Its gravity would have been too weak to hold on to the gases in our atmosphere, and they would have escaped into space.
2. The presence of oxygen in the Earth's atmosphere allows us to breathe and is needed by almost all forms of life.
3. Mars is smaller than Earth, so its weaker gravity was unable to hold on to a thick atmosphere, resulting in its thin air.

NODIA

194. In a pond, a female fish releases her eggs into the water. A male fish then releases his sperm over the eggs. This process, where the joining of gametes (sperm and egg) happens in the water outside the female's body, is a form of sexual reproduction. The resulting zygotes develop into embryos within the water itself.

Questions:

1. In animals, what are the male and female gametes called?
2. What is the process of the male and female gametes joining called?
3. How does this method of reproduction in fish differ from that in mammals like humans?

Ans :

1. The male gametes are called sperm and the female gametes are called eggs.
2. The joining of gametes is called fertilization.
3. In fish, fertilization takes place in the water (externally), while in mammals like humans, it takes place inside the female's body (internally).

- **Atmosphere-Hydrosphere Interaction** : The atmosphere drives the water cycle. Solar energy evaporates water from the hydrosphere (oceans, lakes), which then forms clouds in the atmosphere and returns as rain, distributing fresh water across the geosphere, which is vital for the biosphere.
- **Geosphere-Biosphere Interaction** : The geosphere provides the physical foundation and nutrients for life. Rocks weather to form soil, and the biosphere enriches this soil with organic matter from decaying organisms, a process driven by decomposers. Plants (biosphere) anchor soil (geosphere), preventing erosion.
- **Biosphere-Atmosphere Interaction** : The biosphere regulates the composition of the atmosphere. Plants and algae perform photosynthesis, consuming carbon dioxide and releasing the oxygen that most animals need for respiration. This interaction is fundamental to the air we breathe.
- **Overall Interdependence** : No single system acts in isolation. Water, air, land, and life are all woven together in a delicate balance. A disturbance in one system, like atmospheric pollution, can negatively impact the hydrosphere (acid rain), geosphere (soil contamination), and biosphere (health issues).

181. What is the 'triple planetary crisis'? Explain each of its three components and how human actions fuel them.

Ans :

The 'triple planetary crisis' refers to three interconnected, human-driven environmental threats that endanger life on Earth:

- **Climate Change** : This is the long-term alteration of global temperatures and weather patterns. It is primarily fueled by the burning of fossil fuels (coal, oil, gas) for energy, which releases greenhouse gases like carbon dioxide. These gases trap excess heat in the atmosphere, leading to global warming, melting ice caps, and more extreme weather events.
- **Biodiversity Loss** : This is the rapid decline and extinction of plant and animal species. Human actions such as deforestation for agriculture and urban development, pollution, and over-harvesting destroy natural habitats. When habitats vanish, the species that depend on them cannot survive, which weakens entire ecosystems.
- **Pollution** : This involves the contamination of our environment with harmful substances. It includes air pollution from industrial emissions, water pollution from factory waste and plastic, and soil pollution from agricultural chemicals. This contamination directly harms human health and disrupts the natural balance of ecosystems.

182. Compare and contrast the reproductive strategies and embryo development in fish, birds, and mammals.

Ans :

Fish, birds, and mammals exhibit distinct reproductive strategies that reflect their evolutionary adaptations for survival:

- **Fish (External Fertilization & Development)** : Most fish use external fertilization. The female releases eggs into the water, and the male releases sperm over them. The zygote develops into an embryo externally, with no parental protection in most species. They often lay thousands of eggs to counteract high mortality rates from predation and environmental hazards.
- **Birds (Internal Fertilization, External Development)** : Birds use internal fertilization. The female then lays a hard-shelled egg containing the fertilized zygote. The embryo develops outside the body but is protected by the shell and parental care (incubation). The egg contains a finite amount of yolk for nourishment.
- **Mammals (Internal Fertilization & Development)** : Like birds, mammals use internal fertilization. However, the embryo develops entirely inside the mother's body within the uterus. It receives continuous nourishment and oxygen directly from the mother until it is born, offering a high degree of protection and increasing survival chances.

183. How do the non-living components of an ecosystem air, water, and sunlight—directly support the processes of life?

Ans :

The non-living components are the fundamental pillars that support all life processes within an ecosystem:

Click Here to Buy book on Amazon

199. Gases like carbon dioxide in the Earth's atmosphere trap some of the heat that radiates from the Earth after it is warmed by the Sun. This process, the greenhouse effect, is important because it keeps the planet's temperature just high enough for water to remain in its liquid state. Without this mild effect, Earth would lose its heat and become too cold.

Questions:

1. What is the process called where gases in the atmosphere trap heat?
2. How does the greenhouse effect help sustain life on Earth?
3. The atmosphere on Venus is almost entirely carbon dioxide, creating an extreme greenhouse effect. What is the result of this on Venus's temperature?

Ans :

1. This process is called the greenhouse effect.
2. The greenhouse effect helps keep the temperature on Earth just high enough for water to remain in the liquid state.
3. The result is that Venus becomes the hottest planet in the solar system, even hotter than Mercury, which is closer to the Sun.

200. A student plants a small piece of ginger in a pot with moist soil. She ensures it gets enough sunlight and water. After some time, she observes new shoots and roots growing from the ginger piece, which eventually develops into a new, full-sized ginger plant. This is a form of vegetative propagation, a type of asexual reproduction common in many plants.

Questions:

1. Is vegetative propagation a form of sexual or asexual reproduction?
2. In this process, what part of the original plant was used to grow a new one?
3. Will the new ginger plant be genetically different from the parent piece it grew from? Explain why.

Ans :

1. Vegetative propagation is a form of asexual reproduction.
2. A piece of the ginger (which is a modified stem or rhizome) was used.
3. No, it will be genetically identical. Asexual reproduction involves a single parent and produces offspring that are exact copies of that parent.

201. The burning of fossil fuels like coal and oil releases extra greenhouse gases into the atmosphere, trapping more heat and causing global warming. This long-term change in temperature and weather patterns is called climate change. Even a small temperature increase can melt ice caps, raise sea levels, and cause extreme weather, threatening ecosystems and coastal cities.

Questions:

1. What is the term for the long-term changes in temperature, rainfall, and weather patterns?
2. What is the primary cause of the increased greenhouse gases leading to global warming?
3. Explain how the melting of ice caps, caused by climate change, can be a threat to coastal cities.

Ans :

1. These long-term changes are called climate change.
2. The primary cause is the burning of fossil fuels like coal and oil.
3. The melting of ice caps causes sea levels to rise, which could lead to the flooding of many coastal cities.

NODIA

202. The Earth's systems, including the geosphere, hydrosphere, atmosphere, and biosphere, are all interconnected and work together to support life. Cutting down a forest (biosphere) can impact rainfall (hydrosphere/atmosphere) and soil quality (geosphere). This shows that life survives because everything works in a delicate balance, and protecting this balance is essential for our planet's future.

Questions:

1. What are the solid parts of the Earth, including rocks and soils, known as?
2. Give one example of how the different Earth systems are interconnected.
3. Why is it stated that a "small change in one part can impact" the whole system?

Ans :

1. They are known as the geosphere.
2. An example is how soil (geosphere) provides nutrients that plants (biosphere) need to grow.
3. It is because all the systems are interdependent. A negative change in one system, like deforestation, will have cascading effects on the others, such as changing weather patterns and degrading soil, thereby disrupting the overall balance that sustains life.

****

Volcanic eruptions (geosphere) can release gases and ash into the atmosphere, affecting climate and air quality. These interactions constantly shape the physical landscape and atmospheric conditions.

187. Analyze why a planet's location, size, and composition must all be suitable for life to arise and be sustained.

Ans :

The existence of life requires a delicate and complex interplay of multiple planetary characteristics; no single factor is sufficient:

- **Location (Habitable Zone)** : A planet must orbit its star at a distance where temperatures allow for liquid water. Too close, and water boils away; too far, and it freezes solid. Liquid water is the medium in which the chemistry of life, as we know it, occurs.
- **Size (Gravity)** : A planet must have sufficient mass to generate enough gravity to hold onto an atmosphere. Without an atmosphere to trap some heat and provide essential gases, a planet would be barren and subject to extreme temperature swings, making it inhospitable.
- **Composition (Atmosphere & Surface)** : The planet's atmosphere needs the right mix of gases, including oxygen for respiration and gases for a moderate greenhouse effect. Furthermore, a protective element like an ozone layer or a magnetic field is crucial to shield the surface from deadly solar and cosmic radiation.

CASE BASED QUESTIONS

188. The Earth orbits the Sun at a perfect distance where the temperature allows water to exist mostly in its liquid form, which is essential for life. If Earth were closer to the Sun like Venus, its oceans would evaporate. If it were farther away, its water would freeze. This specific orbital region is known as the habitable or "Goldilocks" zone.

Questions :

1. What is the range of distances from a star where water can remain liquid called?
2. What would happen to the water on Earth if the planet were much closer to the Sun?
3. Why is the presence of liquid water considered essential for life to evolve and thrive?

Ans :

1. It is called the habitable zone, or sometimes also called the 'Goldilocks zone'.
2. If the Earth were closer to the Sun, it would be too hot and all the water would evaporate.
3. From what we know so far, liquid water is essential for life to evolve.

189. Earth is constantly bombarded by high-energy particles from space, known as cosmic rays and solar wind, which can harm living cells. Fortunately, Earth's magnetic field acts like a protective shield, pushing away many of these harmful particles and keeping our atmosphere and life on our planet safe. This is one of the key features making Earth habitable.

Questions:

1. What two types of harmful particles from space does the text mention?
2. What feature of the Earth acts like a protective shield against these particles?
3. What is believed to be the origin of Earth's magnetic field?

Ans :

1. The text mentions cosmic rays that come from far across the universe and particles from the Sun called the solar wind.
2. The Earth's magnetic field acts as a protective shield.
3. It is believed that the movement of molten iron in Earth's core may be the origin for Earth's magnetic field.

NODIA

190. A student plants a piece of a sprouted potato in moist soil. After a few days, she observes a new plant with roots, a stem, and leaves growing from it. This is an example of vegetative propagation, a form of asexual reproduction. The new potato plant is an exact copy of its single parent, as it grew from a part of the original plant.

Questions :

1. What is the type of reproduction where a single parent produces new individuals?
2. What is the specific name for asexual reproduction in plants using parts like stems or roots?
3. Is the new potato plant genetically identical to or different from its parent? Explain why.

Ans :

1. This is called asexual reproduction.
2. It is called vegetative propagation.

interconnected and affect one another. A change in one part, such as deforestation, can trigger a chain reaction, impacting everything from local rainfall and soil stability to the survival of animal species. This delicate balance is what keeps our planet stable and habitable for all forms of life.

176. What are the four main systems that interact to sustain life on Earth?

Ans :

The four major interconnected systems that sustain life on Earth are:

- **The Atmosphere** : The layer of gases surrounding the planet.
- **The Hydrosphere** : All the water on Earth, including oceans, rivers, and ice.
- **The Geosphere** : The solid parts of the Earth, such as rocks, soil, and landforms.
- **The Biosphere** : All living organisms, from microbes to plants and animals, and their environments.

177. How can the simple act of a bird dropping a seed lead to a new plant?

Ans :

This process is a key part of seed dispersal. A bird eats a fruit containing seeds. After digesting the fleshy part, the bird flies to a new location and excretes the undigested seed. If the seed lands in a suitable environment with water and soil, like a crack in a wall after rain, it can germinate and grow into a new plant.

LONG ANSWER QUESTIONS

178. Explain in detail the three primary factors that make Earth the 'Goldilocks' planet, perfectly suited for life.

Ans :

Earth is considered a 'Goldilocks' planet due to a unique combination of factors that are 'just right' for life:

- **Perfect Distance from the Sun** : Earth orbits within the habitable zone, where temperatures are moderate. This position prevents it from being too hot, which would cause all water to evaporate, or too cold, which would cause all water to freeze. This allows water to exist predominantly in its liquid state, a crucial ingredient for all known life.
- **Ideal Size and Gravity** : The planet's size is large enough to generate a gravitational field strong enough to hold onto a substantial atmosphere. This prevents essential gases like oxygen from escaping into space, which is a problem for smaller planets like Mars.
- **Protective Atmosphere and Magnetic Field** : Earth's atmosphere not only provides breathable air but also contains an ozone layer that shields life from harmful UV radiation. Additionally, the planet's magnetic field deflects damaging solar winds and cosmic rays, safeguarding both life and the atmosphere itself.

179. Describe the key differences between asexual and sexual reproduction, focusing on parents, offspring, and genetic variation.

Ans :

Asexual and sexual reproduction are fundamentally different processes for creating new life, with significant implications for species survival:

- **Number of Parents** : Asexual reproduction involves only a single parent. In contrast, sexual reproduction requires the involvement of two parents, typically a male and a female.
- **Offspring Characteristics** : In asexual reproduction, the offspring are genetically identical to the parent, essentially being clones. Offspring from sexual reproduction inherit a unique combination of genes from both parents, so they share some traits but are not identical to either parent or their siblings.
- **Genetic Variation and Adaptation** : Asexual reproduction produces very little genetic variation, which can be a disadvantage in changing environments. Sexual reproduction is a major driver of genetic diversity, creating new combinations of traits that allow populations to adapt and evolve over time, increasing their chances of long-term survival.

180. Analyze how the four major Earth systems—atmosphere, hydrosphere, geosphere, and biosphere—interact to sustain life.

Ans :

Life on Earth is sustained through the continuous and intricate interactions between its four major systems:

Downloaded from www.pdf.tube

195. The Earth's atmosphere contains a special form of oxygen called ozone, which forms the ozone layer. This layer is crucial for sustaining life because it acts like a shield. It blocks most of the harmful ultraviolet (UV) rays from the sun. These UV rays can damage living cells, making the ozone layer a vital protection for all life on Earth.

Questions:

1. What is the name of the special form of oxygen that makes up the ozone layer?
2. What is the main function of the ozone layer?
3. Some harmful particles from space can damage the atmosphere and reduce the ozone layer. What protects the Earth from these particles?

Ans :

1. The special form of oxygen is called ozone.
2. The ozone layer acts like a shield, blocking harmful ultraviolet (UV) rays from the Sun.
3. The Earth's magnetic field protects the atmosphere and ozone layer by pushing many of these harmful particles away.

196. In sexual reproduction, offspring are created from the genetic material of two parents. The new individual gets a unique mix of instructions, or genes, from both parents. This is why brothers and sisters in the same family can look different from each other. This mixing of genes creates variation, which is essential for species to adapt to changing environments over time.

Questions:

1. What are the instructions passed from parents to offspring that are stored inside every cell?
2. Why are offspring produced by sexual reproduction not exact copies of either parent?
3. How do small changes and variations passed down through reproduction help a species survive?

Ans :

1. The instructions are called genetic material or genes.
2. This is because instructions from two parents combine to create offspring that are not exactly like either of the parents.
3. Sometimes, these small changes can help a plant or animal survive better in a new environment, allowing the species to adapt and continue.

Download INDIA's Best Study app NODIA

NODIA

197. The Earth can be seen as a giant team project where different systems work together. The geosphere (rocks and soil) provides nutrients for the biosphere (living things). The hydrosphere (water) supports life and is part of the weather cycle influenced by the atmosphere (air). A change in one system, like deforestation, can impact them all.

Questions:

1. What are all the living beings on Earth, along with the places they live, collectively called?
2. Give one example of how the geosphere supports the biosphere.
3. Explain why ? "preserving and protecting clean air, water, soil, and all forms of life isn't just important but essential."

Ans :

1. They are collectively called the biosphere.
2. The geo - sphere provides soil which is rich in nutrients that plants need to grow.
3. It is essential because Earth is a vast system where land, air, water, and living things are all interconnected and support each other. Damaging one part can negatively impact the others and threaten the balance that keeps the planet habitable.

198. After fertilization, birds and mammals have different strategies for nourishing their developing embryos. A bird lays an egg which contains all the food the embryo needs until it hatches. In most mammals, the embryo develops inside the mother's body, which provides all the necessary food and oxygen until the baby is born.

Questions:

1. In birds, where does the development of the zygote into an embryo happen?
2. What is the main source of nutrition for a developing mammal embryo?
3. What is one advantage of the mammal's strategy of internal development compared to a bird laying an egg?

Ans :

1. In birds, this development happens inside the egg after it is laid.
2. The mother's body provides all the food and oxygen the baby needs to grow.
3. Developing inside the mother's body provides greater protection from predators and environmental dangers compared to an egg laid in a nest.

- **Sunlight** : This is the primary energy source for most ecosystems. Plants use sunlight for photosynthesis, the process of converting light energy into chemical energy (food). This food forms the base of almost every food chain, providing energy for all other organisms, either directly or indirectly.
- **Air (Atmosphere)** : The atmosphere provides essential gases. Oxygen is required by most plants and animals for cellular respiration to release energy from food. Carbon dioxide is the key ingredient that plants use during photosynthesis. The atmosphere also helps regulate the planet's temperature.
- **Water (Hydrosphere)** : Water is indispensable for life. It acts as a solvent, transporting nutrients within organisms, and is a key component of cells. It facilitates chemical reactions, helps regulate body temperature in animals, and is necessary for photosynthesis in plants. The presence of liquid water defines habitability.

184. Explain how reproduction leads to both continuity and variation within a species, and why both are important.

Ans :

Reproduction is a dual-purpose process that is essential for the long-term success of any species:

- **Continuity** : The fundamental purpose of reproduction is to create new individuals, ensuring that the species continues to exist from one generation to the next. Parents pass on their genetic material (genes), which contains the instructions for building an organism of the same kind. This ensures that cows produce calves and cats produce kittens, maintaining the continuity of the species.
- **Variation** : Sexual reproduction introduces variation by combining genes from two different parents. This mixing results in offspring with unique combinations of traits, different from both parents and siblings. This genetic diversity is crucial for adaptation. When the environment changes, some individuals with new traits may be better suited to survive, ensuring the species as a whole can persist and evolve.

185. Discuss the consequences of destroying natural habitats like forests and wetlands for human development.

Ans :

The destruction of natural habitats for human development triggers a cascade of negative environmental consequences:

- **Loss of Biodiversity** : Habitats provide food and shelter for countless species. Destroying them is the leading cause of biodiversity loss, as plants and animals lose their homes and food sources, leading to their decline and potential extinction.
- **Disruption of Ecosystem Services** : Healthy ecosystems provide vital services. Forests purify the air by absorbing carbon dioxide, while wetlands filter water and prevent floods. Destroying these habitats diminishes these free and essential services, leading to poorer air and water quality.
- **Climate Impact** : Forests are major carbon sinks. Deforestation releases large amounts of stored carbon into the atmosphere, contributing significantly to the greenhouse effect and accelerating climate change. This can alter local rainfall patterns and temperatures.
- **Soil Erosion and Degradation** : The roots of trees and plants in natural habitats hold soil in place. When they are removed, the soil becomes vulnerable to erosion by wind and rain, leading to land degradation and loss of fertile topsoil.

186. Using examples, explain how interactions within the biosphere, geosphere, and atmosphere work together in a balanced ecosystem.

Ans :

The balance of an ecosystem relies on the seamless interaction between Earth's major spheres:

- **Biosphere-Geosphere** : Plants (biosphere) draw nutrients and water from the soil (geosphere) to grow. When these plants and other organisms die, decomposers (biosphere) break them down, returning nutrients to the soil, thus enriching the geosphere for future life. Plant roots also bind the soil, preventing erosion.
- **Biosphere-Atmosphere** : Plants perform photosynthesis, taking carbon dioxide from the atmosphere and releasing oxygen, which animals then breathe. This process is a critical exchange that maintains the composition of the air we depend on.
- **Atmosphere-Geosphere** : Atmospheric processes like wind and rain (weather) cause erosion of the geosphere (rocks and landforms).

Click Here to Buy book on Amazon

Visit :
www.pdf.tube

Download PDFs For :

- ✓ Chapterwise Question Bank
- ✓ JEE NEET Foundation
- ✓ Primary Classes Worksheets
- ✓ Olympiad Guide
- ✓ Sample Papers
- ✓ Previous Year Papers
- ✓ Previous JEE Papers
- ✓ Previous NEET Papers

NODIA

Nodia Editions LLP
125, Sector 6, Vidhyadhar Nagar, Jaipur 302039

MRP ₹ 450.00